ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

Lulay Camp

Environmental Assessment Number OR-080-03-17
Tract Number 03-502

June 2003

United States Department of the Interior
Bureau of Land Management
Oregon State Office
Salem District
Cascades Resource Area
Linn County, Oregon

Responsible Agency:	USDI - Bureau of Land Management
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Abstract: This environmental assessment discloses the predicted environmental effects of one action alternative and one no action alternative for federal land located in Township 10 South, Range 1 East, Sections 19, 29 and 33; and Township 10 South, Range 2 East, Section 19, Willamette Meridian; and within the Crabtree Creek and Thomas Creek Watersheds. Alternative 2 is the proposed action. Two projects will be analyzed. Project 1 components include: Commercial thinning approximately 243 acres, partial cutting approximately 42 acres, and windthrown stand restoration on approximately 12 acres of forest stands in GFMA; density management on approximately 23 acres in Connectivity; and density management with snag creation and CWD creation on approximately 31 acres in the Riparian Reserve. Project 2 is habitat restoration without wood removal in the Riparian Reserve throughout the sections where project 1 is proposed.

FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number OR080-03-17) for a proposal to harvest 351 acres of 40-70 year-old stands using a variety of partial cut harvest methods, and to regeneration harvest and reforest a twelve acre stand of 70 year old trees which was severely damaged by wind and then salvage logged.

Location: Linn County, Oregon approximately 10 – 15 miles southwest of Lyons, Oregon.

Land Use Allocations (LUA): General Forest Management Area (GFMA) and Connectivity (CONN) portions of the Matrix LUA, and Riparian Reserve (RR) (as identified in the *Salem District Record of Decision and Resource Management Plan* (RMP) dated May 1995.)

Watershed Information: Crabtree Creek and Thomas Creek drainages of the South Santiam River Watershed. The South Santiam River Watershed is not a Key Watershed (RMP p. 6). The South Santiam River Watershed is part of the municipal watershed for the City of Jefferson, Oregon.

The environmental assessment (EA) is attached to and incorporated by reference in this Finding of No Significant Impact (FONSI) determination.

Implementation of the proposed action will conform to management actions and direction contained in the attached *Lulay Camp Environmental Assessment* and the *Salem District Record of Decision and Resource Management Plan* (RMP). The RMP, dated May 1995, is tiered to and incorporates the analysis contained in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/FEIS) (September 1994). The RMP provides a comprehensive ecosystem management strategy in conformance with the following documents:

- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late Successional and Old Growth Related Species Within the Range of the Northern Spotted Owl* (April 1994);
- *Final Supplemental Environmental Impact Statement on Management of Habitat for Late Successional and Old Growth Related Species Within the Range of the Northern Spotted Owl* (February 1994);
- *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (*ROD, January, 2001*);*
- *Final Supplemental Environmental Impact Statement for Survey and Manage, Protection Buffers, and Other Mitigation Measures in the Northwest Forest Plan (*FSEIS, November, 2000*);* and the
- *Implementation of 2001 Survey and Manage Annual Species Review (*June 2002*)*.

The EA and FONSI will be made available for public review from **June 11 to July 11, 2003**. The notice for public comment will be published in a legal notice by the Albany Democrat Herald newspaper; sent to those individuals, organizations, and agencies that have requested to be involved in the environmental planning and decision making processes; and posted on the

Internet at http://www.or.blm.gov/salem/html/planning/index.htm under Environmental Assessments.

Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before July 11, 2003 at 4:00 PM, Pacific Daylight Saving Time, will be considered in making the final decisions for this project. Office hours are Monday through Friday, 7:30 A.M. to 4:00 P.M., excluding holidays.

Finding of No Significant Impact

Based upon review of the EA and supporting documents, I have determined that the Proposed Action (Alternative 2) is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area.

No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, an environmental impact statement is not needed. This finding is based on the following discussion:

Context: The proposed action (commercial thinning, partial cut, and density management harvest in 40-70 year old stands on 339 acres, and regeneration harvest on 12 acres of windthrown 70 year old trees to begin stand restoration) is not expected to have international, national, regional, or statewide importance All 351 acres are on BLM administered land.

The discussion of the significance criteria that follows applies to the intended action and is within the context of local importance. Chapter IV of the EA details the effects of the proposed action. None of the effects identified, including direct, indirect and cumulative effects, are considered to be significant and do not exceed those effects described in the RMP/FEIS.

Intensity: The following discussion is organized around the Ten Significant Criteria described in 40 CFR 1508.27.

1. **Impacts may be both beneficial and adverse.**

   Anticipated beneficial effects addressed in the EA include: **1)** In the long term, the proposed project would result in increased average tree diameters in the treated stands compared to untreated stands. **2)** In the short term, the project would enhance elements of structural diversity by creating snags and coarse woody debris.

   Potential adverse effects associated with the project: **1)** Soil compaction and disturbance would occur with ground based yarding, but would remain within RMP standards and guidelines; **2**) There is a low probability of measurable direct or indirect effects to water resources, including aquatic habitat; **3)** Harvest would degrade approximately 297 acres of northern spotted dispersal habitat and downgrade 42 acres of marginal suitable habitat in the short term. The effect call is "*may affect, and is likely to adversely affect*" the northern spotted owl; **4)** Other short term effects to flora and fauna include changes in microhabitat due to reducing the forest canopy. Habitat conditions within 10 – 20 years of the thinning would improve over the current existing condition.

Project design features and mitigation measures designed to reduce negative effects to resources are described in Chapter II. The environmental effects disclosed above and discussed in detail in Chapter IV of the EA and associated appendices are not considered significant, nor do the effects exceed those described in the RMP/FEIS.

2. **The degree to which the selected alternative will affect public health or safety.** Thinning and Riparian treatments are not expected to affect public health and safety.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas.** There are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area. There is no northern spotted owl critical habitat in the project area.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial.** Three letters were received during the scoping period and raised no issues or concerns not already being addressed by the IDT. The effects of the proposed action on the quality of the human environment were adequately understood by the IDT to provide an environmental analysis. A disclosure of the predicted effects of the proposed action is contained in Chapter IV of the EA and associated appendices.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** The proposed action is not unique or unusual. The BLM has experience implementing similar actions in similar areas. The environmental effects to the human environment are analyzed in Chapter IV of the EA. There are no predicted effects on the human environment that are considered to be highly uncertain or involve unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.** The proposed action does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. Any future projects would be evaluated through the National Environmental Policy Act (NEPA) process and would stand on their own as to environmental effects.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.** The interdisciplinary team evaluated the proposed action in context of past, present and reasonably foreseeable actions. Significant cumulative effects are not predicted. A complete disclosure of the effects of the project is contained in Chapter IV of the EA.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.** The proposed action would not adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the proposed action cause loss or destruction of significant scientific, cultural, or historical resources.

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973.**

Terrestrial Wildlife: The Lulay Camp proposal was submitted for Formal Consultation with U.S. Fish and Wildlife Service on September 3, 2002. This project *"May affect and is likely to adversely affect"* the northern spotted owl. The proposed action will follow all applicable terms and conditions from the Biological Opinion dated February 27, 2003 [BO# 1-7-03-0008].

Fish: Consultation with NOAA Fisheries for Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon, both listed as "threatened" under the ESA of 1973 is in progress. Concurrence is expected on a determination of "may affect, not likely to adversely affect" Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon. A decision on project implementation would not be made prior to completion of consultation with NOAA Fisheries for listed fish species.

Flora: None of these species were found to exist in the project area.

10. **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.** The proposed action does not violate any known Federal, State, or local law or requirement imposed for the protection of the environment. The EA and supporting Project Record contain discussions pertaining to the Endangered Species Act, National Historic Preservation Act, Clean Water Act, Clean Air Act, and Executive Order 12898 (Environmental Justice). State and local interests were given the opportunity to participate in the environmental analysis process. Furthermore, the proposed action alternative is consistent with applicable land management plans, policies, and programs.

Prepared by: M Keith Walton — Date 10 June 2003
Keith Walton, Forester

Reviewed by: Carolyn Sands — Date 6/11/03
Carolyn Sands, NEPA Coordinator

Approved by: for Rudolph J. Keller — Date 6/11/03
Brad Keller, Acting Field Manager
Cascades Resource Area

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Chapter I PROJECT SCOPE

A. Project Location

The project is located approximately 10-15 miles southwest of Lyons, Oregon, in Linn County, Sections 19, 29 and 33, Township 10 South, Range 1 East; and Section 19, Township 10 South, Range 2 East, Willamette Meridian (WM). The project is on forested land managed by the Cascades Resource Area, Salem District, Bureau of Land Management (BLM). The project area lies within the Crabtree Creek and Thomas Creek drainages of the South Santiam River Watershed.

The proposed project is located within both the General Forest Management Area (GFMA) and Connectivity portions of the Matrix, and in the Riparian Reserve (RR) land use allocations (LUA), as identified in the *Salem District Record of Decision and Resource Management Plan* (RMP) dated May 1995. The South Santiam River Watershed is not a Key Watershed (RMP p. 6). This watershed is part of the municipal watershed for the City of Jefferson, Oregon.

B. Purpose of and Need for Action

The forest in the project area and vicinity were all logged in the 1930s, 40s and 50s. Clearcut harvest with tractor logging resulted in even-aged stands with very little species diversity. There is a mix of stand conditions in the proposed project due to varying degrees of reforestation success, compaction, prior management activities, and windstorms.

1. Matrix Land Use Allocation – GFMA

a) Timber Management

The purpose of this project would be to contribute to both the immediate and long-term sustainable supply of timber and other forest products, which would contribute to local and State economic diversity, as described in the Resource Management Plan (RMP) pages 20 and 46-48 while maintaining future forest management options and protecting other resource values. Thinning and other management activities are proposed to achieve these goals at this time.

Suitable managed timber stands may be partial cut under a variety of prescriptions to provide immediate timber harvest and to increase timber production. (RMP p. 48). The IDT also concurred that an additional purpose for this project would be to maintain continuous canopy cover longer than the 80-110 years anticipated in the RMP by treatments that would extend the rotation and keep management options open.

In a small stand where a tornado-like windstorm damaged or uprooted most of the trees, immediate intervention is required to salvage wind damaged, standing trees, to avoid development of a brush patch, and to establish a conifer forest stand in the windthrown stand in the project area. A brush patch in this location would not meet either timber or habitat objectives.

b) Development of Desired Stand Characteristics

In order to retain future management options on a landscape level, timber harvest and related management practices would be designed to maintain a variety of stand age and size classes in the vicinity, provide for windfirm forest stands at densities that allow timber stand growth at or near what the site is capable of supporting, be resistant to insects, diseases and wildfires, protect water quality, and provide elements of complex stand structure such as snags, down logs and more rapid development of larger diameter trees.

c) Roads

Roads in the project are to be managed to provide an adequate transportation system to manage timber resources and serve other management needs on Federal, State and private lands in a safe and environmentally sound manner. In order to reduce environmental impacts of roads in the area, some roads have been decommissioned and others have been allowed to naturally revegetate. Some these roads will need to be temporarily reopened to manage the timber resources in the area.

The existing road system was developed to efficiently manage the timber resources less stringent environmental controls than currently exist. Due to current forest management practices, the existing road system does not adequately facilitate management of the timber resources. Therefore there is a need to construct some small road segments.

A review of the road system has also identified some short segments of road that are causing unacceptable amounts of sedimentation to enter streams, and in one case, a fish bearing stream.

2. Matrix Land Use Allocation – Connectivity/Diversity Block

The purpose of and need for action in Connectivity is essentially the same as in GFMA, except that a higher percent of each connectivity block is to be maintained in late-successional forest a longer rotation is planned. Forest management practices would be designed to recover old-growth conditions in approximately 100 to 120 years (stand age) to provide for connectivity habitat between Late-Successional Reserves and to maintain ecologically valuable structural components such as down logs, snags, broken top trees, large trees, diverse tree and understory species, and variable stand densities (RMP pp. 21, 48). Density management is needed in the proposed project units in the Connectivity block to prevent this dense stand of hemlock from stagnating and contributing to neither habitat nor timber objectives.

3. Riparian Reserve Land Use Allocation

The purpose of any management activities in the Riparian Reserve is to meet ACS objectives and provide habitat for terrestrial species. Numerous trees need to be removed from the site to achieve the desired stand characteristics, so it is logistically and economically essential to accomplish this work as part of the timber harvest on adjacent Matrix lands.

4. Conclusion

In summary, the purpose and need for this project is to:

- Contribute toward District timber management goals and local economic diversity.
- Manage these timber stands on Matrix lands for a sustainable supply of timber and other forest commodities for future harvest and other management options.
- Manage the roads in the area to meet transportation needs and ACS objectives.
- Increase the structural diversity of forest stands in portions of the Riparian Reserve to meet ACS habitat objectives.

- Increase structural diversity in upland stands to be harvested.
- Manage stands in Connectivity to contribute to the goal of developing old growth forest structure at age 100.

C. Decisions to be Made

The Cascades Field Manager will decide whether or not to prepare an environmental impact statement, and which, if any, of the project elements to implement.

D. Issues and Concerns

In compliance with NEPA, the project first appeared in the July 2001edition of the quarterly *Salem District Project Update,* and in editions since then, which were mailed to over 1,000 addresses. Also, a *scoping* letter was mailed on February 27, 2003 to potentially affected and/or interested individuals, groups, and agencies. A total of four letters were received as a result of this scoping as of May, 2003 when this is being written. These are available for inspection in the project development file at the Salem District office.

Members of the public who responded to the BLM as a result of this scoping raised the following concerns, which were already being addressed by the IDT:

- Timber harvest – Both the need to harvest timber volume, and the need to avoid significant impacts to the forest ecosystem and provide for future forest values were expressed in comments.
- Existing trail use – One comment noted that the OHV trail through unit 19D is used by nearby residents for access to neighbors' properties and requested that this practice be allowed to continue. This use is provided for in the design features for the road to be constructed.
- Road construction, road density and road decommissioning – Comments, both written and verbal, expressed concern about the effects of road density, and the need to minimize or eliminate new road construction. Proposed road construction, and opening currently closed roads, is limited to the amount needed to avoid greater impacts from ground based logging without the new roads. Open road densities and decommissioning are addressed in the following chapters of the EA. A "No new roads" alternative was considered and dropped, as described in Chapter II.D.
- Legacy features – Concern was expressed about potential damage to residual old growth trees, large mature trees, snags and CWD. Layout and logging design features are proposed to protect these legacy features, as described in Chapter II.
- Riparian restoration treatments and riparian density management – Concern was expressed about potential effects of timber harvest and other management activities in the Riparian Reserve. The need for these proposed activities is described in Chapter III, and the design features to ensure that ACS Objectives are met are described in Chapter II and in Appendix 2.

The design features (Chapter II. C. of this EA) were developed to address concerns with each of these items. The affected environment is described in Chapter III and the environmental consequences are described in Chapter IV of this EA.

No issues were raised that resulted in the development of separate alternatives. Three issues were identified that led to the IDT considering other alternatives that were later dropped from further analysis. These issues and the rationale for dropping them from further analysis are described in Chapter II. D. The issues were:

- Regeneration harvest of units 19B and 29A in 10-20 years. Defer action until then.
- Harvest of Units 19B, 29C, 29D and 5A. Dropped from proposed action.
- No new road construction. Dropped from consideration if units are to be managed as proposed.

Chapter II ALTERNATIVES, INCLUDING THE PROPOSED ACTION

The required No Action Alternative and the Proposed Action are presented in this section and analyzed in Chapters III and IV of this EA. In addition, a second action alternative that was considered by the IDT and dropped, and additional potential harvest units that were considered and dropped from the Proposed Action are described. All numbers (e.g., acres, road lengths and volumes) are estimates based on GIS mapping and office analysis. Final numbers, determined during field work, will vary from these estimates. This variance is not expected to result in a change in effects analyzed in this document.

A. Alternative 1 - No Action

The BLM would not implement any of the Lulay Camp projects at this time. The local plant and animal communities would be dependent on and respond to ecological processes that would continue to occur based on the existing condition. This alternative serves to set the environmental baseline for comparing effects of the action alternatives.

B. Alternative 2 – The Proposed Action

1. Project 1 – Timber Harvest and Associated Silvicultural Treatments

Five distinct silvicultural treatments, in three Land Use Allocations (LUA), are included in this project, totaling 351 acres. All timber harvest would be done with ground based logging equipment (skidders, harvesters, forwarders, etc.). Other associated actions are also included in the project.

a) Silvicultural Treatments

1) Regeneration Harvest (Regen.) - Restoration of Windthrown Stand

Twelve acres of wind damaged, 70 year old, Douglas-fir timber that has already had a salvage logging operation would be regenerated after designating 6-8 green trees per acre for retention, plus 2 snags and 2 trees for CWD, harvesting the remaining merchantable timber, and preparing the site for planting by piling and burning slash. A mix of conifer species would be planted and maintained until well established. The intent of this regeneration harvest is to restore a stand that incurred significant windthrow in 2002. .

2) Partial Cut Harvest (PC)

42 acres of managed 70 year old Douglas-fir timber (commercially thinned in 1981) would be partial cut to provide an immediate timber harvest while retaining canopy cover and keeping future management options open. Previously thinned seventy year old stands on GFMA designated land

would be partial cut with the intent to remove some timber volume while retaining stocking levels of approximately 60 to 70 trees per acre and maintain a stand relative density of approximately 40-45. This treatment is intended to maintain stands of fast growing large trees, and to maintain a healthy and continuous canopy closure on these areas well into the future, while supplying the local area with a supply of timber, both now and in the future.

3) Commercial Thinning (CT)

243 acres of 40-60 year old conifer forest on GFMA land would be commercially thinned from below, leaving the largest trees with healthy crowns to continue growing. Approximately 20 to 33 percent of the existing basal area (a measure of tree density based on the square feet per acre of wood in a cross section of all trees at 4.5 feet above the ground) would be removed from the sites to improve the growing conditions for the residual trees by giving them more room to grow, retaining stocking levels of 70-120 trees per acre.

4) Density Management (DM)

Approximately 23 acres of Connectivity Block and 31 acres of Riparian Reserve would be "thinned" in a treatment called "Density Management" that creates a variable density stand out of a fairly uniform stand. The intent of Density Management is to initiate and accelerate development of a more diverse stand structure, including: large diameter trees, variable stand density, wolf trees (larger trees that are semi-open grown and have developed large diameter limbs relatively low on the bole, which provides habitat features preferred by some wildlife species), snag habitat and coarse woody debris (CWD), and to develop late-successional characteristics by stand age 100. Selection of trees to be cut would be based on site needs. This action would be accomplished as a timber harvest and it would resemble a commercial thinning in many ways. However, the treatment areas would contain some areas of light intensity thinning, some areas of moderate intensity thinning, and some areas of a heavier intensity thinning, with residual tree densities of 70 to 160 trees per acre (average 120 per acre). Treatments in Matrix and Riparian Reserve areas would be similar, with treatments in Riparian Reserves done on a smaller scale and tending toward lighter intensity thinning. Additional areas with these characteristics on the edges of the proposed units may be identified as Riparian Reserve rather than Matrix when field measurements are completed. The nature and relative scope of the Riparian Reserve treatments would be consistent with the description in this EA, but acreages may change with more accurate mapping based on field measurements. Density Management in Riparian Reserves would be done as a part of the timber sale in adjacent Matrix ground.

Density Management, Connectivity
23 acres of a 50 year old hemlock stand would be thinned to a prescription designed to provide for a healthy, windfirm stand structure, and rapid development of late successional forest characteristics within an extended (150 year) timber rotation (the objective is "old growth like structure" by stand age 100).

Density Management, Riparian Reserve
31 acres of Douglas-fir plantation in Riparian Reserve would be thinned to a prescription designed to increase the structural diversity of the stands and contribute to Aquatic Conservation Strategy (ACS) Objectives (ACSOs) for terrestrial habitat. Cut green trees which are not needed for CWD would be removed as part of the timber sale on adjacent Matrix land.

Table 1 Unit Acres and Treatments

Unit	Matrix Treatment	Matrix Acres	Riparian Reserve Acres	Total Acres
19A	Regeneration, Windthrow Rest.	12	0	12
19C	CT	10	7	17
19D	CT	53	4	57
29A	PC	42	0	42
29B	CT	94	8	102
33A	CT	34	0	34
33B	CT	31	2	33
33C	CT	21	3	24
2-19A	DM	9	3	12
2-19B	DM	14	4	18
Total		320	31	351

b) Other Associated Actions

Some trees would be topped or killed to create snag habitat. Other conifer trees would be felled and left in place to create Coarse Woody Debris (CWD) habitat. Roads in the project area that do not need to be kept open as part of the transportation system in the project area would be blocked and stabilized to contribute to meeting ACSOs. Truck and skid roads in the approximate locations of trails used by local residents for foot, horse and OHV travel would be stabilized and kept open for continued use of this type.

c) Connected Actions

- Construct and stabilize 3400 feet of temporary dirt truck road in units 19D and 33A.
- Renovate and stabilize 4000 feet of currently unused (blocked or revegetated) roads in units 33A and 33C. [Add this activity to the map] [Explain why roads are currently unused]
- Remove a failing culvert and fill adjacent to unit 2-19A after operations are completed in unit 2-19A. Restore the streambed to its original gradient.
- Maintain and renovate BLM roads used for operations under this timber sale. This consists of roadside brushing, blading the road surface, spot rocking and ditch and culvert maintenance to maintain roads to the standards described in the transportation management objectives and Best Management Practices in the RMP. These standards are designed to provide for safety, reduce the potential for sediment entering streams from the roads, and to facilitate timber harvest and other land management activities.
- Update drainage systems maintenance (culverts, ditches, water bars, etc.) to current 100 year storm event standards, as needed.
- Decommission 1200 feet of existing, unmaintained road in Riparian Reserves to partially restore natural drainage and infiltration patterns.

2. Project 2 – Habitat Restoration Treatments without Wood Removal in Riparian Reserve

Habitat restoration treatments without wood removal would be done within the Riparian Reserve throughout BLM ownership in the sections containing the proposed timber management project as described in Project 1 of the Proposed Action. Project elements include: creating wolf trees, snag habitat, CWD habitat, and small canopy gaps to enhance structural diversity in Riparian Reserve stands where past management practices simplified the stand structure by developing a uniform, even-aged conifer forest with little variability. Treatments would be designed to avoid soil disturbance or increasing water temperature from loss of tree shade. No wood would be removed from the site. Treatments would be done in multiple entries over the next several years as site conditions are appropriate and as time and funds are available. These treatments would be done separately from Project 1.

C. Design Features and Mitigation Measures

In this section, design features and mitigation measures that would be implemented to protect resources from a greater degree of impacts than are analyzed in the FEIS, or to restore impacted resources to a condition which would be within the effects analyzed in the FEIS, are described. Descriptions of these design features and mitigation measures are grouped by the resources they are intended to protect or restore.

1. Project 1 – Timber Harvest and Associated Silvicultural Treatments

a) Soil and Site Productivity

Design features and mitigation measures for soil are implemented to retain the productive capacity of the soil by keeping it in place, and keeping compaction within limits analyzed in the FEIS. Design features incorporate the Best Management Practices (BMP) described in the RMP, plus additional site specific practices as determined by the IDT.

1) Logging, Matrix Land

- Ground based logging equipment systems and operating methods would be designed to prevent soil compaction on more than 10 percent of the ground surface area.
- Skid roads used in previous entries would be re-used wherever feasible to concentrate potential impacts on areas already impacted.
- Wheeled or tracked equipment would not be allowed to operate on slopes steeper than 35 percent to avoid the additional potential soil disturbance and channels for runoff which may be caused by operating this equipment on steeper slopes. Exceptions may be granted for very short pitches of steeper slopes where avoiding the slope would cause greater impacts than operating on the slope, such as where there is an existing skid road on the slope and/or a long skid road would be required to avoid a short pitch.
- Ground based equipment (tractor) operations would be limited to dry soil conditions to minimize compaction, surface runoff and potential soil erosion.
- Slash and organic debris would be maintained on tractor (logging equipment) roads as much as possible to protect soil surfaces from compaction and displacement. The amount that could be maintained would vary with the type of equipment used.
- Waterbars would be constructed on tractor roads as needed to minimize surface runoff and potential soil erosion.
- All roads and landings that have exposed soil following use and stabilization would be seeded with a locally adapted mix of native species seed to stabilize the soil.

- The topography in these units is not conducive to skyline (cable) systems, and the use of helicopters would not be required or anticipated. Any use of these systems would also be designed to meet BMP.

2) Logging in Riparian Reserves

Logging systems to accomplish Density Management in Riparian Reserves would be designed to meet the following criteria:

- Combined compacted and disturbed soil from logging operations would be limited to no more than five percent of the surface area.
- No ground based equipment would operate on slopes greater than 30 percent, except short pitches where going around the area would result in greater potential impacts.
- No new multi-pass skid roads would be created. Existing skid roads may be used.
- Single passes with low ground pressure undercarriage equipment operating on top of a slash and brush mat has been demonstrated to result in extremely low compaction and disturbed soil, and would meet the above criteria. Other systems meeting the criteria may also be used.

3) Site Preparation

- In the windthrown stand restoration unit, unit 19A, slash and brush would be piled for burning to facilitate reforestation and to reduce potential fire hazard. Piling may be done by an excavator or by hand, depending on site conditions after harvest.
- If piled with an excavator, work would be done under the following conditions to minimize compaction and erosion:
- Piling operations would be limited to dry soil conditions.
- Operating methods appropriate to the site conditions (for example: using skid trails, walking the machine on top of slash, single pass only, use of low ground pressure tracks) would be used to minimize compaction.
- The grapple head used would be designed to pick up slash with minimal soil disturbance.
- Slash piles would be covered with plastic sheeting when piled, then burned after the fall rains begin when soil moisture would reduce soil heating and fire would not broadcast through unpiled slash.

4) Roads

- Road and landing construction, maintenance and use requirements would be designed to keep soil compaction and disturbance within the minimum surface area needed for safe operations.
- Approximately 3400 feet of temporary natural surface road would be constructed and 4000 feet of currently unused (blocked or revegetated) road would be renovated, as part of this timber sale. These roads would be stabilized following timber harvest operations. Stabilization would include: blocking access to prevent motor vehicle use, constructing water bars, out-sloping the road surface so that water drains quickly to stable slopes, seeding, and/or scattering woody debris on the surface.
- The natural surface road to be constructed in unit 19D would follow the established route of an existing heavily used OHV trail, which, in turn, appears to follow an old tractor skid road. The existing junction of the OHV trail and the existing road, within the Riparian Reserve, would be used to avoid constructing additional road on undisturbed ground immediately adjacent to the Riparian Reserve and renovating additional natural surface road in the Riparian Reserve.
- Road construction and stabilization operations, and use of natural surface roads would be limited to dry soil conditions to minimize surface runoff and potential soil erosion.
- Newly disturbed soil associated with road and landing construction and stabilization would be seeded (with a locally adapted mix of native species seed) to stabilize the soil and prevent erosion.

b) Water Quality and Hydrology

Design features and mitigation measures for water quality are implemented to reduce non-point source pollution to the maximum extent practicable as required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987). Design features and mitigation measures that serve to keep soil in place by minimizing compaction, runoff and erosion also serve to keep sediment out of water and are an essential part of the plan to maintain water quality. Additional design features to maintain water quality are described in this section.

1) Timber Harvest Operations

- The standard Riparian Reserves of one site-potential tree height (200 ft. in the project area) on non-fish bearing streams and two site potential tree heights (400 ft.) on fish bearing streams would be implemented adjacent to all harvest units. Except for the proposed Density Management in the Riparian Reserve, no ground disturbing activities would take place within these Riparian Reserves.
- In the Density Management in the Riparian Reserve areas, no timber harvest or other ground disturbing activities would be done within 50 feet of any stream ("no entry" or "no treatment" buffer). Treatment boundaries would be more than 50 feet from the stream where ecological breaks indicate that this would be more appropriate.
- Riparian Reserves, "no entry" buffers and leave tree densities of 70-160 trees per acre where Density Management would occur in the Riparian Reserve would be designed to prevent more than minimal changes to shading of streams.
- Log hauling and other heavy truck traffic would be limited to relatively dry road conditions to minimize the risk of fine sediment inputs to streams from roads.
- No trees would be felled into or yarded through the "no entry" buffers on streams or wet areas to avoid introducing sediment into water sources or disturbing stream banks and channels.
- Skid trail patterns would be designed to avoid concentrating runoff water flows or directing them into streams.

2) Road Construction, Stabilization, Maintenance, and Decommissioning

- No ground disturbing activities, including road construction, stabilizing, maintenance and similar activities would be permitted during the wet season to prevent introducing sediment into streams.
- Temporary roads to be constructed or renovated would be kept as narrow as feasible, and out-sloped where feasible so that water drains to stable slopes.
- The junction of the road to be constructed and the existing road in unit 19D would be designed to avoid sediment inputs to the small constructed pond adjacent to the existing road and OHV trail.
- Vegetation would be maintained in ditches within 200 feet of all stream crossings to trap sediment before it enters the stream. Where ditches are not vegetated to provide a sediment trap, artificial sediment traps would be used as needed.
- Natural surface roadbeds, stabilized roadbeds, and soil exposed by road construction and stabilization would be treated with erosion control measures to prevent erosion prior to winter. Typical measures could include: erosion matting, drainage modification, seeding with native or sterile vegetation, etc.
- Road stabilizing would be done to partially restore infiltration and drainage patterns.
- Temporary roads constructed and previously stabilized roads renovated for timber harvest operations, and selected existing roads would be stabilized.
- Road stabilizing would be accomplished as soon as feasible after timber harvest.
- Damaged, deteriorated and under-sized culverts would be replaced, and new culverts installed, as needed to meet current 100 year storm event standards to prevent road failure and sedimentation of streams. The failing, undersized culvert on Road 10-2E-19, adjacent to units 2-19A&B. The fill at

the crossing would be removed after operations are completed on unit 2-19A and the streambed restored to its original gradient. All work would be done according to all applicable in-stream work guidelines and seasonal restrictions.

- Road decommissioning would include: removing cross drain culverts, ripping to restore infiltration, establishing native vegetation to stabilize soil, and drainage modification to direct surface water onto stable forested slopes. There are no live stream culverts to remove.

c) Vegetation

Design features and mitigation measures for vegetation are implemented to ensure the immediate and long-term sustainability of timber production by harvesting timber according to sound silvicultural principles, protecting the health of the residual timber stand after commercial thinning or partial cut harvest, and effectively reforesting the site after windthrown stand restoration harvest and treatment. Other design features are implemented to maintain or enhance complex forest stand structure, maintain elements of old growth and late-successional forest in the vicinity of the proposed timber harvest, provide adequate protection for special status plant species, and minimize potential noxious weed and invasive plant infestations.

1) Residual Stand Protection - Commercial Thinning and Partial Cut Harvest Units, and Density Management

- In addition to seasonal restrictions to protect soil, water and wildlife resources, no skidding or yarding would be allowed during the spring growing season (typically May 01 to July 01) when bark and cambium are easily damaged by those operations.
- Falling and logging techniques designed to minimize damage to residual trees would be required. Examples of potential techniques include: pre-planned skid/yarding roads, falling to lead, rub trees, etc.

2) Leave Trees in Commercial Thinning and Partial Cut Harvest Units, and Density Management Areas

- In commercial thinning units, the prescription would be designed to retain relatively large and high quality trees at a spacing that would encourage rapid growth, healthy trees, and a windfirm stand of timber.
- In partial cut harvest units, the prescription would be designed to leave the largest and best quality timber trees and allow trees that contribute to stand and structural diversity to continue growing.
- In density management areas, the prescription would be designed to increase species and structural diversity in the retained stand to promote desirable stand structure and habitat features over the life of the stand while not unduly degrading current habitat.
- All Partial Cut/Commercial Thinning/Density Management Units:
- Generally, the smaller and more deformed trees would be selected for harvest, leaving the largest and highest quality trees to continue growing to become high quality timber (Matrix only) or develop old growth stand characteristics (Connectivity and Riparian Reserves) more quickly than they would develop without intervention.
- Some cull and deformed trees would be retained for structural diversity and potential wildlife habitat. Retention of trees with special habitat features would be emphasized in the Density Management areas.

3) Late-successional Structure

- All residual old growth trees and snags found to be present in the proposed harvest units, and many of the largest second growth would be reserved as future legacy trees for their late successional

structure. Second growth trees larger than 30 inches DBH would only be felled when necessary for safe operations. If felled, these second growth trees would be reserved as CWD.

4) Site Preparation and Reforestation of Windthrown Stand Restoration Unit

- After harvest, all remaining brush taller than three feet would be cut (slashed) immediately after completion of yarding, or uprooted during machine piling, to reduce brush competition with conifer seedlings and increase plantable area.
- Healthy conifer reproduction would be protected from damage as much as is feasible.
- Slash would be piled and burned.
- A mix of conifer species indigenous to the area, primarily Douglas-fir, western hemlock and western red cedar, would be planted after site preparation. Natural regeneration of tree species would also be encouraged to ensure a diversity of species and genetic stock in the future stand.
- Competing vegetation would be managed to minimize negative effects on overall stand growth for several years after planting.

5) Special Status Species

- No design features are required for special status or Survey and Manage botanical species, none were found in the project area.

6) Noxious Weeds

- All ground disturbing equipment would be cleaned and free of soil and plant parts before entering BLM lands to prevent spreading noxious weeds.

d) Terrestrial Wildlife

Design features and mitigation measures for wildlife are implemented to protect or mitigate the effects of the proposal to Special Status, SEIS Special Attention, and Species of Concern, and restore or enhance habitat by improving stand structure and encouraging the development of late seral conditions through thinning and density management.

1) Remnants, Snags and Coarse Woody Debris (CWD)

- In unit 19A (Regeneration Harvest, Windthrown Stand Restoration), a minimum of six to eight green trees per acre would be retained to develop a large green tree component as the new stand develops, plus up to an additional four trees per acre to create snag and CWD habitat in the short term.
- Sound, windfirm trees would be selected whenever possible.
- Any retained trees that must be felled for logging feasibility or safety would be left on site as part of the CWD requirement.
- Retain and protect all old growth remnant trees. Unit layout, marking guidelines, and harvest operations would be designed to prevent damage to these trees. (The only old growth remnant trees known to exist at the time of this writing are in unit 29A.)
- Retain existing large snags and down logs where feasible. Unit layout, marking guidelines, and harvest operations would be designed to prevent damage to these resources whenever feasible.
- Retain large second growth trees (30 inches DBH and larger) where feasible.
- Top up to two green trees per acre in units 19A and 29A to create cull trees with deformed crowns that are expected to develop desirable habitat characteristics or become snags. Topping would also further reduce the windthrow potential of these trees.
- In unit 29A, a plan would be developed with the purchaser of the timber sale to mitigate the safety hazard created by dead tops still attached to wildlife trees that were top girdled, in a previous

contract, to create snag habitat. The safe part of these trees would be retained as wildlife trees where feasible. Where they must be felled for safe logging operations, they would be retained as CWD. (Units 19A&B also had this treatment, but few, if any, such trees in 19A survived the windstorm and 19B has been dropped from the proposal.)

- Cull and deformed trees, minor conifer species in monoculture stands, and hardwoods would be retained as a component of the future stands to provide desirable habitat components.

2) Special Status, SEIS Special Attention, and Species of Concern

Federally Listed Species

- **Spotted Owls:** Place seasonal restrictions on all felling, yarding, and road construction and stabilizing operations from March 1 – July 15; and on blasting from March 1 – September 30 to minimize the risk of disturbing nesting spotted owls. These seasonal restrictions could be waived early if ongoing surveys indicate no presence of spotted owls within disturbance range (0.25-0.5 miles) of the harvest units.

Bureau Sensitive, SEIS Special Attention, and Other Species of Concern

- **Red Tree Voles:** Known locations of red tree voles would be protected according to Management Recommendations for the Oregon Red Tree Vole dated September 27, 2000. This includes protecting a minimum ten acres reserve of contiguous habitat area with at least one site potential tree height between the nest tree and the habitat area boundary. Applying these standards to red tree vole nests in the Lulay Camp proposal resulted in dropping Units 29C&D and 5A from the proposed action.
- **Mollusks:** Populations of *Megomphix hemphilli* would be protected as follows:
- Three management strategies are recommended in the *Management Recommendations for Terrestrial Mollusk Species, Megomphix hemphilli (MEHE)*, the Oregon Megomphix, Version 2.0 where MEHE is locally common.
- In units 19C&D, 29A&B, and 33A&B, apply Strategy Three, maintain favorable conditions in enough of the Habitat Area (the survey area) to maintain occupation by this species while allowing thinning to occur. Accomplish this by retaining and releasing bigleaf maple trees, locating designated skid roads and other logging practices to minimize disturbance to CWD, maintain at least half of the current canopy closure, and maintain 10-20 percent of the Habitat Area in an undisturbed condition.
- In units 33C and 2-19A, apply Strategy One. Protect know locations of *MEHE* with a buffers as necessary to maintain micro-habitat and persistence of known populations.
- No design features are necessary in unit 2-19B (no *MEHE* found) or in unit 19A (site conditions changed completely as a result of the wind storm and protection of the single site located in this unit is no longer practical).
- MEHE sites in units 29C&D and 5A, and other areas dropped from the original draft of the proposal would remain unaffected by the proposed action.

3) Road Densities

- After timber harvest is completed, close and stabilize new roads and currently closed roads that would be renovated to reduce road densities and the effects of open roads on wildlife.

e) Fisheries and Aquatic Habitat

- Specific design features for harvest operations are described in the "Soil and Site Productivity" and "Hydrology and Water Quality" portions of this section.
- All design features to protect water quality would protect fisheries.

f) Fire and Fuels

- Slash and debris piles at all landings, and miscellaneous locations where warranted, would be burned to remove the largest concentrations of fuels along the road system.
- Piles to be burned would be covered with plastic when logging operations are completed and burned after fall rains begin when the soil is wet and surrounding fuels would not support active burning, even at the close of a protracted east wind event.
- On unit 19A, slash piles created by site preparation operations would be covered and burned as described above.
- Piles to be burned would be located to minimize heat damage to tree crowns or boles.
- Where feasible, piles to be burned would be located on roads, landings, and other locations where heat damage to the soil would not further reduce site productivity.
- All burning would be done in accordance with "The Oregon Smoke Management Plan".

g) Visual, Recreation, and Rural Interface Resources

- To reduce potential impacts to residents along haul routes, no log hauling would be allowed on weekends, or on weekdays that are part of July 4th and Labor Day holiday periods. (Memorial Day is prior to the operating season.)
- To accommodate historical use patterns by neighboring residents, existing trails would be left in usable condition when feasible.

h) Other

1) Special Forest Products (SFP)

- Following harvest of commercial timber, firewood cutters may be allowed to cut and remove firewood from landing piles. Logs contributing to the 240 lineal feet of CWD per acre would be excluded from firewood cutting.
- Permits to collect above ground plant materials (fern fronds, moss, salal, mushrooms, etc.) would be issued prior to harvest activities in the proposed harvest areas.

2) Cultural Resources

- Surveys for cultural and archeological resources have not identified any sites in the proposed timber harvest units. If any sites are identified during timber harvesting, the operations would be immediately halted and the Field Manager would be notified. Operations would be resumed only with the Field Manager's approval, and only after appropriate mitigation measures were designed and implemented to provide any needed protection of those resources.

2. Project 2 – Habitat Restoration Treatments Without Wood Removal in Riparian Reserve

- Create small canopy gaps or enhance existing small gaps by girdling or falling up to eight green trees per acre.
- Maintain selected "wolf trees" with the same type of treatment.
- Create up to four snags per acre by base girdling or topping trees.
- All treatments would be done in areas within the Riparian Reserve and more than 50 feet from any stream channel.
- Treatments would be accomplished in multiple entries over a period of years to minimize risk of bark beetle damage to residual Douglas-fir trees.

D. Alternatives Considered But Dropped from Detailed Analysis

1. Regeneration Harvest of Units 19B and 29A in 10-20 Years

These stands would be expected to reach Culmination of Mean Annual Increment (CMAI) in approximately 10-20 years, if no treatment were done at this time. The RMP allows regeneration harvest on GFMA lands at CMAI. Selection of this alternative would essentially be the "No Action Alternative" at this time, and evaluate the stand for treatment under management plans that would be in place then. Partial cutting in this stand, as in the proposed action, would delay CMAI 10-20 years (approx. 30 years from now), effectively delaying consideration of this alternative by one or two decades.

The IDT concluded that the proposed action described in this EA would fulfill current timber harvest objectives while leaving future management options open. Selection of the No Action Alternative for either the entire Lulay Camp Project, or for unit 29A (19B was already dropped, see next section), would preserve this alternative for consideration in 10 years.

2. Units 19B, 29C, 29D, and 5A

Units 19A and B were one stand in the original submission of potential units for the Lulay Camp project, with a timber type and history similar to unit 29A. The portion of the stand most suitable for partial cutting was damaged by the windstorm and is now separated out as unit 19A. Further analysis of the remainder of the stand, unit 19B, revealed that there are only small pockets where treatment would be appropriate and the IDT elected to drop the entire 19B.

Units 29C and D, and unit 5A are thirty year old plantations that are rapidly reaching the point of stagnation, with resulting decline in tree and stand health. They were added to the project after Red Tree Vole (RTV), mollusk and botanical surveys had been completed on the rest of the units, so surveys were only recently completed. Multiple RTV and mollusk sites were found in these young stands. Protection buffers preclude treatment on large portions of the units under current requirements and the IDT concluded that it would be better to drop these stands from the proposed action and wait five years to see if requirements change enough to allow treatment of the entire stands.

3. No New Road Construction

The basic alternative to constructing the two proposed natural surface roads (Units 19D and 33A) would be to skid logs to the existing roads. The skid trails would most likely follow the exact route of the proposed roads to be constructed.

Experience and observation indicate that the potential impacts of a 14 ft. wide natural surface road on flat ground, with no turnouts and no clearing limits beyond the road surface; and a 12 ft. wide main skid road with passing points are very similar. Compacted area is essentially the same, due to the need for multiple skidders to pass as they meet, creating some compacted areas more than 20 ft. wide. Stumps in the roadbed would be grubbed for a truck road, creating disturbance, while logging equipment would more likely deviate their path to go around them, increasing the disturbed and compacted area. In unit 19D, additional skid road would have to be designated around the Riparian Reserve and a large landing area created at the existing road immediately adjacent to the Riparian Reserve if the road were not to be constructed. The proposed road would follow an already disturbed and compacted route to a landing far from the riparian area. Both types of road would be stabilized,

neither would be ripped since ripping would further damage tree roots and potentially introduce additional disease to the stand.

Since the potential impacts are essentially the same, the economics of using natural surface truck roads rather than substantially longer skidding led to dropping the "no new roads" alternative from further consideration. Dropping units 19D and 33A from the proposed harvest would implement a "no new roads" alternative, but would also reduce the acres treated and the timber volume harvested.

Chapter III AFFECTED ENVIRONMENT

Chapter III describes the present condition (i.e., affected environment) within the project area for the following resource categories: soil and site productivity, hydrology and water quality, vegetation, terrestrial wildlife, fisheries, fire and fuels, visual/recreation/rural interface resources, special forest products and cultural resources. Additional resources or values, for which review is required by statute, regulation, Executive Order, or policy, are described in Appendix A: Elements of the Environment.

A. Environment Affected by Project 1 - Timber Management

1. Soil and Site Productivity

The proposed timber sale is located within the Western Cascades physiographic region. It is situated in both the Thomas Creek and Crabtree Creek 5th Field Watersheds, which are tributaries of the South Santiam River 4th Field Watershed. Typical soils, within this area, formed in colluvium (material rolling downhill) from basic igneous, sedimentary, or tuffaceous rock. These warm soils are gentle sloping, moderately deep to deep, well-drained silty clay loams and gravelly loams.

The timber productivity capability class (TPCC) system classifies lands based on the physical and biological capabilities of the site to support and produce forest products on a sustained yield basis. All proposed timber harvest units are mapped as being suitable for timber production and harvest.

Primary timber management concerns in the area of the proposed timber harvest are to avoid ground based yarding on steep slopes (>35%) and/or during wet soil conditions, and potential competition from brush or hardwood species that could make reforestation difficult after regeneration harvest. Surface erodability is low and runoff is slow to medium for all of these soil types. Depth to water table is more than six feet. Equipment limitations, seedling mortality, and windthrow hazard are slight to moderate.

Some of the areas where habitat restoration without wood removal in the Riparian Reserve is proposed are classified as unsuitable for timber production. This is not a concern, for no timber harvest is proposed and timber production is not a management objective in these areas.

2. Water Quality and Hydrology

a) Project Area Precipitation and Basin Hydrology-

The project area is located in the Oregon Western Cascades range at elevations between 1,100 – 1,800 feet. Portions of the project area are subject to rain on snow events (ROS) that have the potential to increase peak flows during winter or spring storms. This zone varies with temperature during winter storms but is assumed to lie between 1,500 - 3,000 feet in elevation.

The project area receives approximately 50-100 inches of rain annually and has a mean 2-year precipitation event of 4.0 inches in a 24-hour period (*N.O.A.A. Precipitation-Frequency Atlas for Oregon, Volume X*).

The project area is in five separate 8th field watersheds (Mill Creek, Burmester Creek, Upper Crabtree creek, and two unnamed)) with approximately 15,000 acres (23.4 miles^2) in combined drainage area. The two streams draining the area are Crabtree Creek and Thomas Creek (5th field watersheds), both tributary to the South Santiam river fourth field #17090006 (U.S.D.I., 1974). The South Santiam is utilized as a drinking water source for the city of Jefferson and thus the project lies within a portion of the municipal watershed. The project is not part of a key watershed.

b) Project area stream flow

Stream-flow is assumed to be typical of western Cascades streams where most stream flow occurs during winter storm events. Peak flows occur following a rapid and substantial depletion of the snow-pack during prolonged rain-on-snow periods (ROS) in the **"**transient snow zone" (TSZ), estimated to lie between 1,500 feet and 3,000 feet elevation. Parts of units 33B&C and 2-19A&B are in the TSZ. No useful steam gauging station data relevant to the Lulay Camp proposal is available.

Base-flow or low-flow occurs during late summer and early fall when mean stream discharge drops below 20% of the mean winter flow. Many small headwater channels dry up completely during this period.

c) Project area stream channels

The streams in the project area reflect the geologic origin of the area. Most of the terrain is composed of weathered volcanic rocks and deposits. There are only two perennial streams immediately adjacent to the proposed treatments: one between units 2-19A and B and the other by unit 29B. Both streams are described as "step-pool channels" and have entrenched into the relatively unresistant bedrock forming moderately constrained valleys with low gradient adjacent slopes (average 25-30%). There is a large supply of gravel and sand sized material actively transported in these channels, which, when coupled with an ample supply of wood, has resulted in complex, meandering channels with many, small zones of sediment deposit (i.e., bars, flood plains, and wetlands). Both channels are currently in "proper functioning condition" (*U.S.D.I., 1998*).

The remaining channels adjacent to the proposed treatment units are small with intermittent or ephemeral flow. These small tributary channels formed in the deep soils of the benches and ridges in the project area and flow intermittently on the surface before disappearing underground, only to pop out again down-slope. It's likely that ground water and intricate patterns of subsurface flow, as opposed to surface run-off, is the primary system of water delivery to channels in the area. Most are lower gradient (4-10%) with small substrates reflecting the adjacent soils and too low a gradient to be subject to debris torrents or landslides. All of the channels viewed in the field are currently in "proper functioning condition" (*U.S.D.I., 1998*).

In addition, there are fish bearing perennial streams south of unit 19C and between units 33B and C. These streams are not described as "immediately adjacent to the proposed treatments" due to the width (250-400 ft.) of the untreated Riparian Reserve and the presence of a road between the treatment areas and the stream. Both streams are currently in a "proper functioning condition".

d) Project area wetlands

There were no wetlands in the project area identified on National Wetlands Inventory maps; the Linn County Soil Survey; the BLM GIS Lakes theme for smaller wetlands, ponds and lakes; or the BLM TPCC theme in GIS, which has a category for sites with high water tables. All of these inventories are based on review of aerial photographs with limited field verification and thus small (<1 acre) areas with high water tables, ponds and/or wetlands are typically not identified, particularly when situated under forest canopy.

During field review of the project area and vicinity, locations with high water tables, ponds and/or wetlands were identified. These were mapped, the appropriate GIS themes were updated, and applicable protection measures applied.

e) Project area water quality

The water quality parameters with the potential to be affected by this proposal include stream temperature, dissolved oxygen (DO) concentrations, hydrogen ion concentration (pH), and turbidity. Additional water quality parameters (e.g., nutrients, pesticide and herbicide residues, bacteria, etc.) are not highly sensitive to forest harvest and road construction (*U.S.E.P.A.,1991*) and were not reviewed for this analysis.

1) Stream Temperature

The Crabtree Watershed Analysis (BLM, 2001) indicated that summer stream temperatures in the Crabtree Creek main channel are above the State of Oregon's threshold of 17.8^{o} C. The Thomas Creek Watershed Analysis (U.S.D.I., 1996) did not cite any data on stream temperature for the watershed.

Salem District BLM has collected summer stream temperatures at three locations in the project area watersheds: Neal Creek main-stem, South Neal Creek headwaters and on an unnamed headwater tributary to Roaring River. The Neal Creek main-stem (T10S, R.1E, section 23) data indicated that 7-day maximums remained below the state threshold throughout the summer of 2000. Similarly, the South Fork Neal Creek (T10S, R.1E, section 27) and the Roaring River tributary (T11S, R1E, section 5) data indicated that 7-day maximums remained below the state threshold throughout the summer of 2000.

2) Dissolved Oxygen, pH, and Conductivity

The Crabtree Watershed Analysis stated that "data collected by the South Santiam Watershed Council indicate dissolved oxygen and pH are probably not of concern in Crabtree Creek (Ch.5, Pg.29)." However, the Thomas Creek Watershed Analysis cited an Oregon DEQ report that identified low levels of dissolved oxygen as a non-point source pollution type in the watershed (see Oregon DEQ, below).

No data for these variables in the immediate project area was located for this assessment. Considering the low stream temperatures in the project area, together with full forest cover, it is likely that DO and pH levels are within the range of natural variation and meet state standards.

3) Turbidity and Sediment

No data for stream turbidity in the project area was located for this assessment. The Thomas Creek Watershed Analysis cited the Oregon DEQ report that identified turbidity as a non-point source pollution type in the watershed (see Oregon DEQ, below). Landslides in upper Thomas

Creek were identified as important source areas for fine sediments and turbidity. In the project area, due to the low to moderate slopes, landslides are uncommon.

4) Oregon Department of Environmental Quality (DEQ)

The DEQ's 1998 303d List of Water Quality Limited Streams is a compilation of streams which do not meet the state's water quality standards. Thomas Creek, Crabtree Creek, and Neal Creek are all listed as not meeting water quality standards for summer stream temperatures. The DEQ is currently developing a Total Maximum Daily Load (TMDL) for the South Santiam watershed.

The DEQ has also published an assessment, the 319 Report, which identifies streams with potential non-point water pollution problems (1988 Oregon Statewide Assessment of Non-point Sources of Water Pollution).

Table 2 - 1988 Oregon Statewide Assessment of Non-point Sources of Water Pollution

Watershed/ Stream Reach	General Water Quality	Drinking Water	Fish	Aquatic Habitat
Thomas Creek/Reach #70	M1	NP	M1	M1
Thomas Creek/Reach #71	M2	NP	M2	M2
Thomas Creek/Neil Creek	NP	NP	NP	NP
Crabtree Creek/Reach #68	M1	NP	M1	M2
Crabtree Creek/Reach #69	M1	NP	M1	M1
Crabtree Creek/Roaring River	NP	NP	NP	NP

NP = No Problem and/or No Data, M1 = Moderate Problem with data, M2 = Moderate Problem based on observation, M3 = Moderate Problem based on perception

Portions of the main-stem of both Crabtree Creek and Thomas Creek were identified as having moderate water quality problems (with data) that may be affecting general water quality, fisheries and aquatic habitat. Types of non-point pollution were identified as turbidity, excessive sediment, low dissolved oxygen, erosion and low flows. Roaring River and Neil Creek were listed as "No Problem And/Or No Data."

Beneficial uses of surface water from the project area are displayed in **Table3.** There is one municipal water user (City of Jefferson) on the South Santiam downstream from the project area as well as water withdrawals for domestic use, irrigation and livestock watering.

Table3 - Beneficial uses associated with streams in the project area.

Stream (Watershed)	Project Action	Beneficial Use	Distance from Project Action	Information Source
Roaring River	Timber harvest: Reductions in stand density with road reconstruction and maintenance	Salmonid rearing and spawning	>1 mile downstream in Crabtree	BLM
		Resident fish & Aquatic Life	immediate	BLM
		Domestic, Irrigation & Live-stock watering	2 miles downstream in Roaring River	WRIS*
		Municipal	>10 miles in South Santiam	BLM

Stream (Watershed)	Project Action	Beneficial Use	Distance from Project Action	Information Source
Lower Thomas and Neil Creek	Timber harvest: Reductions in stand density with road reconstruction and maintenance	Salmonid rearing and spawning	>1 mile downstream in main-stem	BLM
		Resident fish & Aquatic Life	immediate	BLM
		Domestic, Irrigation & Live-stock watering	1 mile downstream in Neil Creek	WRIS*
		Municipal	>10 miles in South Santiam	BLM

*WRIS = Water Rights Information System

f) Roads to be Decommissioned

- Approximately 850 feet of existing, un-maintained road south of unit 19C enters private residential land at the east edge of BLM managed land. It is entirely within the Riparian Reserve, and much of the road is adjacent to and affects the riparian habitat associated with this fish bearing stream. The road is essentially impassable in the winter, with large mud holes due to lack of drainage. Vegetation is closing in on the roadbed. Access to public lands is provided by maintained, rocked roads on the BLM side. Private lands are fully accessed by public roads and private driveway.
- Approximately 450 feet of an existing dead-end road behind locked gates, entirely within the Riparian Reserve. During the wet season, water either flows over, or puddles on, over half of this stretch of road. Roadside vegetation is encroaching on the road in this area. The road becomes impassable at the far end of the section planned for decommissioning.

3. Vegetation

a) Proposed Timber Harvest Units (Common to all Units):

All of the proposed units are second growth stands ranging from 30 to 70 years of age exhibiting varying mid-seral stage vegetation characteristics. Growth rates of these stands are declining as inter-tree competition occurs. Limited amounts of root rot, some dwarf mistletoe, and suppression mortality can be found in most of the stands.

Table 4 - Mapped Stand Type and Narrative Description of Timber Stands for Proposed Timber Harvest Units

Unit/ (Acres) /Mapped Stand Type	Narrative Description of Timber Stand
19A (12 acres) D3 =- 1930	Commercially thinned in 1981. Unit 19A sustained wind damage reducing canopy closures below 40 percent, and was later salvage logged, leaving standing trees. Douglas-fir dominates the overstory, with some western hemlock, grand fir and minor amounts of bigleaf maple and red alder.
19C (17 acres) D3H =- 1940	This stand has never been thinned. The overstory consists of Douglas-fir with some western hemlock, bigleaf maple, red alder, and grand fir. Canopy closures range from 60 to 80.
19D (57 acres) D3 = 1950	This stand has never been thinned. The overstory consists of Douglas fir, bigleaf maple, and some western hemlock, and grand fir. There is a significant hardwood component of bigleaf maple and red alder. Stocking is patchy with canopy closures ranging from 40 to 80 + percent.
29A (42 acres) D3 =- 1930	Commercially thinned in 1981. The overstory consists mostly of Douglas-fir with a significant component of grand fir and some western hemlock, bigleaf maple and red alder. Canopy closures range from 60 to 80 and overstory crown ratios are high. There are a few (<5) old growth Douglas-fir remnants within the unit.

Unit/ (Acres) /Mapped Stand Type	Narrative Description of Timber Stand
29B (102 acres) D3 =- 1950 and D2 =- 1960	This stand has never been thinned. The overstory consists almost entirely of Douglas-fir, with some bigleaf maple. The overstory is thickly stocked and uniformly spaced over most of its area with canopy closures ranging from 70 to 90 percent.
33A (34 acres) 33B (33acres) 33C (24 acres) All D2HM=-1960	These stands have never been thinned. The overstory is dominated by western hemlock and bigleaf maple, with significant amounts of Douglas-fir and grand fir. Canopy closures are variable, ranging from 50 to 80 + percent. There is some root rot and dwarf mistletoe, which is most prominent in unit 33B.
2-19A (12 acres) 2-19B (18 acres) Both H3 =- 1950	These stands were pre-commercially thinned in 1975. The species composition of the overstory is 90 percent western hemlock and 10 percent Douglas-fir. Spacing and tree sizes are uniform throughout the stand and canopy closures are high ranging from 70 to 90+ percent.

b) Riparian Reserves

Portions of Riparian Reserves associated with units 19D, 29A, 29B, 33B, 33C, 2-19A, and 2-19B have been identified for treatment (31 acres). The Riparian Reserves support vegetation that is similar in species composition and stand structure to the upland vegetation, was simplified through the past logging operations, and reflects the same lack of diversity. Additional areas with these characteristics on the edges of the proposed units may be identified as Riparian Reserve rather than Matrix when field measurements are completed. The nature and relative scope of the Riparian Reserve treatments would be consistent with the description in this EA, but acreages may change with more accurate mapping based on field measurements.

c) Special Status Plant Species and Survey and Manage Plant Species

Botanical inventories for lichens, bryophytes and vascular plants were completed using established survey methods and protocols. No Special Status Species or Survey and Manage Species were found within the boundaries of the proposed units.

d) Noxious Weeds and Invasive Plant Species

Several Priority III noxious weed species were found within or adjacent to proposed project area. All of these species are considered to be common components of the roadside plant communities in western Oregon. Infestation levels are minimal and the forest canopy is providing shade that keeps these infestations in check. Meadow Knapweed (*Centarrea pratensts)*, a Priority II noxious weed, was found at two roadside locations while in the Lulay Camp area. No other Priority I or II noxious weed species or other invasive plant species of concern were identified.

4. Wildlife

a) Terrestrial Wildlife

1) Habitat

- All of the proposed units are second growth stands ranging from 40 to 70 years of age exhibiting varying mid-seral stage vegetation characteristics.
- Growth rates of these stands are declining as inter-tree competition occurs.
- The understories consist primarily of vine maple, bigleaf maple, western hemlock, grand fir, cherry, and huckleberries.
- Sword fern, salal, and Oregon grape dominate the ground cover.

- Limited amounts of root rot, some dwarf mistletoe, and suppression mortality can be found in most of the stands.
- There are a few (<5) old growth Douglas-fir remnants in unit 29A. There no old growth remnants in any of the other proposed units.
- There is a larger mature second growth tree component with trees from 28 up to approximately 44 inches diameter in units 19C; 29A; and 33A,B&C. Most of these larger trees are western hemlock and grand fir left from the previous stand.
- Generally, there is a shortage of large snags and coarse woody debris (CWD), especially in the early stages of decay.
- Quantities present in these stands do not meet Northwest Forest Plan (NFP) standards.
- There are moderate to high amounts of large CWD that are in the advanced stages of decay from the previous stand present in units 19C&D; 33A,B&C; and 2-19A&B.
- Approximately two trees per acre were top girdled in unit 29A (also in unit 19B, dropped from the proposal), and many of those trees now exhibit dead tops.
- There are no special habitats (meadows, talus slopes, cliffs and wetlands) within any of the proposed harvest units. Unit 29C (dropped from the proposal) has seasonal ponds/wetlands present, where there is Oregon ash, cascara, vine maple, bigleaf maple, cherry, and red alder.

2) Federally Listed Species - Northern Spotted Owl:

The proposed harvest units provide approximately 42 acres of dispersal and marginal suitable habitat (29A); 297 acres of dispersal habitat (19C&D, 29B, 33A,B&C and 2-19A&B), and 12 acres lacking the elements for habitat (19A). Proposed units are located within the provincial home radius (1.2 miles) of two known spotted owl sites which have been occupied during the last five years and one which has not been occupied since 1995. Units are also located within a quarter of a mile of two unmapped Late Successional Reserves (LSR) core areas, neither of which has been occupied within the last five years. No units are located within Critical Habitat for the spotted owl.

3) Bureau Sensitive, SEIS Special Attention, and Other Species of Concern

- **Amphibians:** Surveys were conducted concurrently with mollusk surveys. Several species found, including:
- Oregon slender salamander, a Bureau Sensitive species. Prefers CWD in advanced stages of decay, which is lacking in most of the units.
- Three aquatic species of Bureau Assessment amphibians either suspected or documented to occur in the Lulay area: The red legged frog has been documented in the Lulay area. Cascade torrent salamander and tailed frog could occur in the area, but are not likely due to elevation, younger forest types, and lack of suitable substrates in the streams.
- **Bats:** Four species of bats, Protection Buffer and/or Bureau Tracking species, could potentially be present in the project area. No structures or cliffs which could provide habitat were found. Snags with bark attached could provide suitable habitat, but are very scarce in these managed, mid-seral stage stands.
- **Goshawk:** While the goshawk, a Bureau Sensitive species, usually prefers older forests at higher elevations, a goshawk was observed in the spring of 1999 east of unit 29B. No goshawks have been found during subsequent surveys in the Lulay area.
- **Olive-sided Flycatcher:** This Bureau Tracking species is uncommon and local at all elevations throughout the Cascades Resource Area, but has not been observed in this area.
- **Red Tree Vole (RTV):** Surveys for the red tree vole, a Survey and Manage Species under the Northwest Forest Plan, were conducted in 2001 and 2003. Forty-four trees with potential nest

structures were located and climbed. Fourteen active and seven inactive nests were found in units 5A, 29C and 29D, all of which have been dropped from the proposed Lulay Camp timber sale.

- **Mollusks:** Surveys for six Survey and Manage mollusk species (two of which were subsequently dropped from the list) were conducted on 868 acres, with a total of 148 sites located. 112 of these sites were the Oregon Megomphix snail, *Megomphix hemphilli (MEHE)*, the only currently listed species found. *MEHE* meets the four criteria for locally common, except in units 19A, 33C, 2-19A and 2-19B. The single site in 19A had canopy closures reduced below 30 percent by the windstorm and is no longer viable. No *MEHE* were located in unit 2-19B.

4) Late Successional Habitat

None of the units in the Lulay Camp proposal are late successional forest habitat. Federal lands in both the Thomas Creek and Crabtree Creek watersheds exceed the 15 percent late successional guideline with over 30 percent of the watershed in late successional forest habitat.

5) Road Densities and Access

Existing road densities in the project area are estimated to be about 4.5 to 5 miles per section, which is high. Roads break up the continuity of habitat and open roads foster more human disturbance than wildlife would experience with closed roads.

5. Fisheries and Aquatic Habitat

Proposed thinning units are located in the Thomas Creek and Crabtree Creek 5th field watersheds. Units 19 A-D, 29A and C and 2-19A and B are located entirely in the Thomas Creek watershed. Units 5A, 33A, 33B1, 33B2 and 33C are located entirely in the Crabtree Creek watershed, while Units 29B and 29D are located on the watershed divide and have parts in both watersheds. Thomas and Crabtree Creeks are tributary to the South Santiam River.

a) Fish Presence

Sampling for fish presence/absence was conducted with an electroshocker on all streams adjacent to potential harvest units on May 21, 2001. Cutthroat trout (*Oncorhynchus clarki*) were found in an unnamed tributary to Thomas Creek on the south side of Unit 19C, and in an unnamed tributary to Roaring River that flows adjacent to the southeast side of Unit 33A and the northeast portion of Unit 33B. Two forks of an unnamed tributary to Crabtree Creek, both adjacent to portions of Unit 29B, were found to support cutthroat trout, sculpins (*Cottus, spp.*) and lamprey (*Lampetra, spp.*). All other streams within at least two site-potential tree heights of the proposed thinning unit boundaries were found to be non-fish-bearing.

Approximately four miles downstream of Units 19A-D Thomas Creek supports anadromous populations of winter steelhead (*O. mykiss*), spring chinook salmon (*O. tshawytscha*) and Pacific lamprey (*Lampetra tridentata*). Resident fish species found in Thomas Creek are rainbow (*O. mykiss*) and cutthroat trout, mountain whitefish (*Prosopium williamsoni*), coarse-scale sucker (*Catostomus spp.*), dace (*Rhinicthys spp.*), sculpin, redside shiner (*Richardsonius balteatus*), northern pikeminnow (*Ptychocheilus oregonensis*), brook lamprey (*L. richardsoni*) and sandroller (*Percopsis transmontana*). Introduced fish species that may be found in the lower reaches of Thomas Creek include largemouth (*Micropterus salmoides*) and smallmouth (*M. dolomieui*) bass, bluegill (*Lepomis macrochirus*) and bullhead (*Ictalurus spp.*).

In the vicinity of Units 2-19A&B, North Fork Neal Creek supports a population of cutthroat trout. Approximately five miles downstream of these units, Neal Creek supports a native population of winter steelhead up to a barrier waterfall at approximate river mile (RM) 4.4.

Approximately three miles downstream of Units 33A&B the Oregon Department of Fish and Wildlife operates a fish hatchery at approximate RM 1 on Roaring River. Upstream migration of anadromous fish is blocked by a weir at Roaring River Hatchery. Roaring River is tributary to Crabtree Creek. Crabtree Creek supports anadromous populations of winter steelhead trout, spring Chinook salmon and Pacific lamprey. Resident fish species known to inhabit Crabtree Creek are cutthroat and rainbow trout, mountain whitefish, dace and sculpin. The lower reaches of Crabtree Creek support a population of redside shiner and non-native populations of largemouth and smallmouth bass and bluegill. The South Santiam River supports a similar mix of species and probably several additional exotic species.

Spring Chinook salmon are native to Thomas and Crabtree Creeks; however, the native runs are believed to be extinct. The existing runs are the result of strays from the McKenzie River and hatchery planting of Willamette stock spring Chinook.

b) Threatened and Endangered and Special Attention Species

Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon are listed as 'threatened' under the Endangered Species Act of 1973, as amended. Both species are found in Thomas and Crabtree Creeks and in the South Santiam River. Consultation with NOAA Fisheries for listed species is in progress for this proposed project. Concurrence by NOAA Fisheries with a determination of "may affect, not likely to adversely affect" Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon is expected. A decision to implement the project would not take place prior to completion of consultation with NOAA Fisheries for listed fish species.

Approximate distances downstream from proposed thinning units to ESA listed fish habitat are as follows:

Units 19C&D:	4 miles to Thomas Creek
Unit 29B:	3 miles to Crabtree Creek
Unit 33A:	3 miles to Roaring River
Units 2-19A&B:	3 miles to barrier falls on Neal Creek

6. Fire and Fuels

There is a low risk of wildfire in the Lulay Camp project area due to the nature of the existing fuels and low probability of ignition sources. Potential sources of ignition are lightning and human activity. In this area, lightning fires rarely occur since lightning storms are usually accompanied by enough rain to prevent fire starts. Most of the areas included in the proposal are behind locked gates, further reducing already low probabilities of human caused fire starts.

7. Visual, Recreation and Rural Interface

a) Visual Resources

The proposed harvest units may be glimpsed from some viewpoints, but no key observable points were identified. Ownership is intermixed and other timber harvest activities, agricultural uses, residences and utilities are observable in the vicinity.

b) Recreation Resources

The area around all of the proposed units is characterized by a forest setting with many modifications to the natural setting on both public and private lands. Roads into 2-19A&B are open for public access, but road systems to all other units are controlled by private gates.

There are Off Highway Vehicle (OHV) and horse trails that receive varying degrees of use in several of the units in T. 10 S., R. 1 E., Sections 19, 29 and 33. A trail through unit 19D is regularly used by local residents and one request to keep the trail useable after harvest was received from a neighboring landowner as a result of scoping. There are no trails apparent in 2-19A or B, though trash dumping is common.

c) Rural Interface

Several of the proposed units are within a ½ mile Rural Interface Area. There is one private residence just west of Unit 19C and discussions with the current residents indicate that they have no specific concerns other than the trail mentioned above. The haul routes pass several residences on private, county and state roads, and have historically been used for log hauling. Access to all residences is provided by County roads.

8. Other

a) Special Forest Products (SFP)

There has been very little historical interest in SFP in this area, and little or no future demand is expected. Potential SFP available include: firewood after logging, cut sticks, greenery, and transplants (vine maple or sword fern).

b) Access

The roads into Sections 19, 29 and 33, T. 10 S., R. 1 E., are all controlled by private gates and are not currently open to the public for travel. Fire suppression agencies have access through the gates on the rocked roads. The road into the west side of section 19 is controlled by a private individual gate and the road is not currently suitable for fire apparatus access.

The roads into unit 33A and the west end of unit 33C are currently blocked and stabilized. The road into the east side of unit 33C is naturally blocked by woody debris and brush encroachment.

The road into the north end of 2-19B and the west end of 2-19A is open for travel, but brush is encroaching. The dead-end road along the west boundary of unit 2-19B is driveable, but the surface is deteriorating. Both of these roads have several roadside garbage dumps.

c) Cultural Resources

Cultural resource surveys were conducted. No cultural resources that would be affected by the proposed project were found and none are on record. The entire area of the proposed project has been previously logged, obliterating any sites which may have existed prior to that time.

Chapter IV ENVIRONMENTAL EFFECTS

Chapter IV describes the changes that can be expected from implementing the action alternative or taking no action at this time. The environmental effects (changes from present base-line condition) that are described in this chapter reflect the following elements of the environment (i.e Soil and Site Productivity; Hydrology and Water Quality; Vegetation; Terrestrial Wildlife; Fisheries and Aquatic Habitat; Fire and Fuels; Recreation, Rural Interface, and Visual Resources; and Other). The EA presents the summary conclusions of the Resource Specialists on the IDT with some additional narrative to provide context. Detailed analysis and background information are described in the specialists' reports. For those resources or values for which review is required by statute, regulation, Executive Order, or policy, Appendix 1

contains the documentation as to the effects of the proposed action on those resources or values. For a full discussion of the physical, biological, and social resources of the Salem District, refer to the Final Environmental Impact Statement (FEIS), dated September 1994, for the Salem District Resource Management Plan. The discussion in this document is site specific[1] and supplements the discussion in the FEIS.

A. Alternative 1 – No Action

1. Soil and Site Productivity

- Soil conditions would be maintained in current conditions in most areas, with current trends of plant roots and animal activity slowly reducing existing compaction.

Additional soil disturbance would be expected in unit 19A due to additional windthrow of trees with weakened root systems, and additional compaction expected from future salvage logging operations.

2. Water Quality and Hydrology

- The existing water quality conditions, stream flows, and channel conditions at the project sites would continue their current trends of change.
- The failing culvert adjacent to units 2-19A&B may continue slow deterioration with no significant changes to water quality and hydrology, or it could fail catastrophically with significant scouring of the stream channel and sediment input to Neal Creek.

3. Vegetation

a) Upland Vegetation

- In the windthrown stand (unit 19A), the remaining 70 year old timber stand would remain on the site. Many of the trees that remain standing following the windstorm and salvage logging would likely sustain additional wind damage due to weakened root systems combined with sparse stocking. Additional timber volume loss from future breakage would be expected. Additional site damage would be expected from multiple salvage logging operations. Brush growth would be expected to accelerate under the open canopy with no site preparation, and conifer establishment would be delayed by decades due to brush competition.
- In the stands proposed for Partial Cut, the stands would continue to grow, but with a declining growth rate. CMAI would be reached in 10-20 years, which would trigger evaluation for regeneration harvest under the current RMP. Total timber volume recovery would be higher than if partial cut now, but waiting until time for regeneration harvest would forego the opportunity to supply wood to the local economy at this time, and to increase the size and clear wood volume in the future would be lost.
- In the stands proposed for commercial thinning, growth rates would continue to decline, late successional structure development would be delayed, and opportunities for future thinning or partial cutting would be lost due to the small live crown ratios and diameter to height ratios that would be expected to develop and make the stand unsuitable for thinning.
- In the upland stands proposed for density management, it is unlikely that Connectivity goals associated with reaching "old growth-like" stand structure by stand age 100 could be met without the level of disturbance that an intermediate harvest would afford. The overstory uniformity and structural simplicity, along with the lack of understory vegetation would remain the dominant features of these stands for decades to come.

[1] This EA does not attempt to re-analyze all possible impacts that have already been analyzed in the FEIS, but rather to identify the particular site-specific impacts that could reasonably occur.

b) Riparian Reserve Vegetation

- Current trends in the development of the existing vegetation and its associated mid-seral stand structure would continue. The growth rate of the overstory would continue to decline. Understory development would continue to lack diversity for decades. Decadence would remain at low levels and be mostly confined to small diameter snags and coarse woody debris due to suppression mortality. As a result, the ACS objectives regarding watershed and landscape scale structural diversity/complexity, connectivity, and habitat goals would not be fully met.
- Snag recruitment in areas of the Riparian Reserve where habitat restoration without wood removal is proposed would occur naturally over several decades rather than beginning within one decade with created snags.

c) Special Status Species and Noxious Weeds

- No change to special status species in the vicinity would be expected.
- No change to trends in noxious weed populations would be expected.

4. Terrestrial Wildlife

- Current trends in developing late successional conditions would continue. Overall, overstocked stands that lack species and structural diversity would take longer to develop late successional conditions than if they were treated as described in the Proposed Action.
- Tree growth rates would continue to decline resulting in slow development of the large diameter trees that provide suitable potential snags and CWD.
- Dense canopy closures would result in slow development of understory layers and vertical structure complexity.
- Existing CWD would remain intact, but would continue to decay. CWD recruitment to replace material depleted by past management practices would be slow.
- There would be no change in spotted owl habitat and no effect to spotted owls. Habitat conditions would continue current trends. Some stands could take longer to develop suitable habitat conditions if left unthinned than if they were to be treated.
- There would be no effect on Bureau sensitive, Special Attention (including Survey and Manage) Species, or other species of concern.

5. Fisheries and Aquatic Habitat

- The existing aquatic habitat conditions at the project sites would continue their current trends of change. Tree growth rates would continue to decline in the Riparian Reserve Treatment areas, resulting in longer time frames for potential recruitment of CWD as compared to implementing the Proposed Action.

6. Fire and Fuels

- Current low probability of ignition and low potential rates of spread for wildfire is expected to remain unchanged.

7. Visual, Recreation, and Rural Interface Resources

- With the exception of unexpected changes (wildfire, disease, etc.), no changes in visual features, recreational use, or activities affecting local residents would occur from activities on BLM lands. Timber harvest related changes would continue on private lands intermixed with BLM lands throughout this area.

8. Other

- Cultural resources and special forest products would not be affected.

B. Alternative 2 – The Proposed Action

Project 1 – Timber Harvest and Associated Silvicultural Treatments

1. Soil and Site Productivity

a) Logging, Matrix Land

- Implementing BMP and the design features described in Chapter II, section C would keep soil damage and site productivity to within the range analyzed in the FEIS/RMP.

b) Logging, Riparian Reserves

- The IDT concludes that the logging system design features described to accomplish Density Management in the Riparian Reserves would not result in loss of site productivity to a degree that would preclude meeting ACS Objectives, and that the effects expected would be minor compared to the long range benefits expected from the treatment.

c) Site Preparation

- Machine piling of slash in unit 19A, combined with compaction from logging operations, would not result in more than 10 percent of the surface area in the unit being compacted by operations associated with the proposed action. This is within the effects analyzed in the FEIS/RMP. Hand piling would cause no additional compaction.
- Burning piles in the wet season would normally result in less than ½ inch of soil being severely impacted by heat directly under the piles. The surface area covered by the piles to be burned would be a very low proportion of the unit area, as shown by previous experience with this type of burning. Since fire would not broadcast across the unit, duff and litter not directly in the piles would remain after site preparation.

d) Roads

- Decommissioning existing roads in Riparian Reserves would begin partial restoration of natural infiltration and drainage processes in these critical locations.
- There would be some net increase in land taken out of the productive timber base due to constructing 3400 feet of natural surface truck roads. (See the "No New Road Construction" discussion under "Alternatives Considered, But Dropped From Further Consideration" in Chapter II of this EA.)
- Blocking roads and main skid trails would prevent additional site productivity loss and sedimentation associated with motor vehicle use.

Constructing the natural surface truck road in the location already impacted by the OHV trail would potentially cause some additional sedimentation to the small constructed pond near the junction and would increase the current incursion of the OHV trail in the Riparian Reserve. However, it avoids renovation of 150 ft. of existing dirt road, construction of a large junction to handle the acute turn, and an additional 200 ft. of new road to circle back to the OHV trail location.

2. Water Quality and Hydrology

a) Peak Flow Enhancement Risk

Jones and Grant (1996), among others, hypothesize that forest management leads to increases in stormflow volume while road construction and wood removal from channels results in earlier, higher peak flows. Stream channel dimensions and characteristics adjust to accommodate the bankfull flows, which correspond to the 1-2 year event in lower gradient steams and apparently to the 5-year event in steeper mountain streams (Wolman and Miller 1960, Lisle 1981). Change in the magnitude of frequent flood flows can affect channel scour and may affect fish habitat. The cumulative effect of increases in runoff can be large, causing flooding, stream channel and bank damage. Alterations in peak flow timing and quantity are particularly of concern in watersheds with potential for snow accumulation and quick melt-off during rain-on-snow events (ROS) such as occurred in the 1996 flood.

A preliminary analysis for the risk of increases in peak flow was conducted using the Oregon Watershed Assessment Manual watershed analysis methods for forest hydrology (OWEB, 1997).

Five seventh field watersheds in the sale area were analyzed using a weighting system based on the dominant precipitation type (rain, transient snow, snow), and the percent of the area with canopy cover less than 30%. Table 5 displays the results.

Table 5 - Risk of Peak Flow Enhancement

Watershed Name	Historic Crown Closure in ROS Areas (%)	Percent of Watershed in ROS Areas (%)	Percent of ROS area with <30% Current Crown Closure (%)	Risk of Peak-Flow Enhancement
Mill Creek	50-70%	0%	0%	Low
Burmester Creek	50-70%	0%	0%	Low
Neal Creek Tributary (Not named)	50-70%	83%	26%	Low
Upper Crabtree Creek	50-70%	0%	0%	Low
Roaring River Trib. (Not named)	50-70%	42%	9%	Low

Risk of peak flow enhancement was determined by plotting the percent area in ROS vs. the percent area in ROS with crown closure < 30% on a graph published in the assessment manual (Page IV-11, Table 6, see below).

Table 6 - Risk Classes

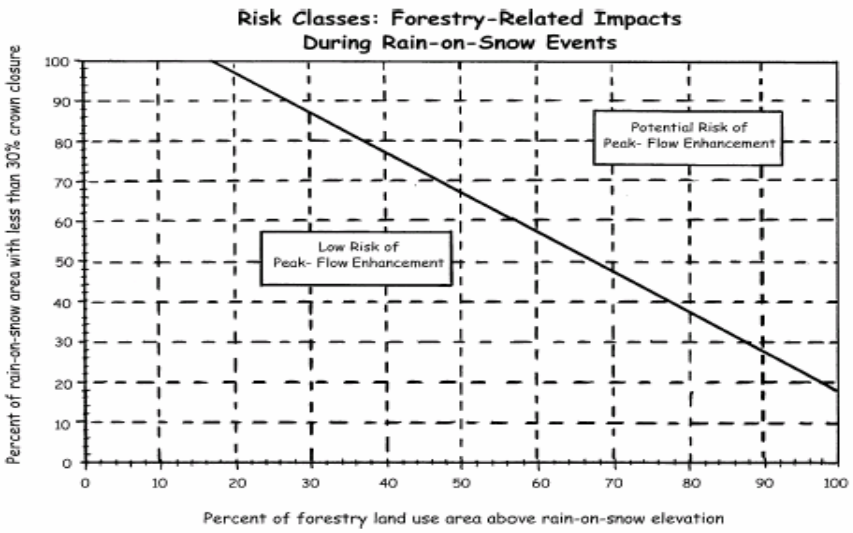

Figure 3. This graph is used to help you estimate the risk of peak-flow enhancement to subwatersheds from forestry-related impacts during rain-on-snow events.

Discussion

Current conditions in the Lulay project area indicate a low risk for peak flow enhancement. Since the Lulay proposal will maintain all treated stands at no less than 40% crown closure, the action proposal results in no additional risk. Even if private land owners in these watersheds were to increase the area with less than <30% crown closure, the proposed action would not be adding to this effect cumulatively. Therefore, the proposed action has a low risk for contributing to cumulative increases in peak flow in these watersheds.

b) Mean Annual Water Yield

- It is assumed that the proposed action would result in some small increase in water yield corresponding with removal of part of the forest overstory. This is likely to have little biological or physical significance.
- The summer base flow could increase, but effects (including hypothetical beneficial effects on the aquatic community) are not likely to be significant or measurable.

c) Water Quality

- The probability of measurable direct and indirect effects to stream flow, channel function and water quality as a result of the proposed action is low. The proposed action is unlikely to alter the current condition of the aquatic system either by affecting its physical integrity, water quality, sediment regime, or in-stream flows.
- The proposed action is unlikely to directly alter base flow or peak flow events in a measurable manner due to the relatively small effect of partial cutting on runoff.
- Slope failure and increases in sediment delivery to streams from mass wasting is unlikely due to the gentle slopes in the proposed project area.
- The BMP and other design features for logging operations, combined with the gentle slopes in the proposed project area, would be expected to limit erosion from the harvest units on Matrix land to well below levels analyzed in the FEIS/RMP.
- Surface erosion on forested land in western Oregon is rare due to the high infiltration capacity of native soils, heavy vegetative growth, and surface organic material. With the minimum fifty feet

wide no treatment buffer and the low levels of surface disturbance and compaction in the Riparian Reserve, the degree of filtering/trapping ability of the soils and vegetation on these gentle slopes would be expected to filter any sediment transported by overland flow before reaching the stream.

- The no treatment buffer and the nature and location of the density management in the Riparian Reserves would not alter the shade regime on the streams significantly. The shading of soils is not expected to change significantly as a result of the proposed action, so water temperature in subsurface flows would not be expected to change. No measurable change is water temperature would be expected and water temperatures would be expected to stay below state thresholds.
- Since the proposed action would not place large amounts of fine organic material in the stream or alter re-aeration, and is unlikely to result in any measurable increase in stream temperature or sedimentation, it is unlikely that this proposed action would have any measurable effect on dissolved oxygen in the project area streams.
- It is unlikely that the proposed action would have any measurable effect on pH or conductivity in project area streams since there is no hard rock mining in the proposal. Hard rock mining is the one activity most likely to have a measurable effect on those variables.
- In conclusion, the proposed action is unlikely to impede or prevent attainment of the stream flow and basin hydrology, channel function, or water quality objectives of the Aquatic Conservation Strategy (ACS).

d) Aquatic Conservation Strategy Objectives (ACSO)

- The Riparian Reserve system (RMP, p. 10) was designed to meet ACS objectives. The one site-potential tree reserves for streams with no fish/two site-potential trees reserves for fish bearing streams (200 ft./400 ft.) established for this proposed action are expected to comply with those standards and meet ACS objectives.
- Many areas of the Riparian Reserves were evaluated to see if treatment would be likely to improve forest stand conditions to better fulfill specific ACS Objectives. Only those areas where the potential benefits of increasing stand structure complexity were evident, and potential impacts from implementing the prescription would clearly not outweigh the benefits, were selected.
- The no treatment buffers would be designed, and expected, to ensure that proposed treatments have minimal potential to directly or indirectly affect water quality.
- The level of disturbance and compaction resulting from logging operations described in Chapter II has low risk for affecting water quality, channel stability or stream flow.
- The IDT recognizes that there is no conclusive data available to use in evaluating the consequences. This conclusion is based on observations of similar logging operations, and the professional judgment of the resource specialists on the IDT that the design features described in Chapter II represent a conservative approach to accomplishing density management objectives with minimal risk of damage to the site.
- Evaluation by the Soil Scientist, Hydrologist, Riparian Ecologist and Fisheries Biologist on the IDT were the primary inputs to this conclusion, with technical feasibility input by the Logging Systems specialist.

3. Vegetation

a) Upland Vegetation

1) Regeneration Harvest – Restoration of Windthrown Stand

- All but approximately eight green trees per acre would be removed from the site.
- A new mixed conifer plantation would be initiated.

- Higher long term recoverable wood fiber yield would be produced than under salvage logging and underplanting options.

2) Partial Cut

- 20-30 co-dominant trees per acre would be removed from the stand, leaving approximately 60-70 green trees per acre.
- The remaining trees would have more room for crown expansion, maintaining a moderate growth rate and delaying CMAI for many years while maintaining a mature conifer overstory to keep future management options open.
- An intermediate harvest would provide timber volume now to benefit the local economy.
- A partial cut at this time would accelerate development of desirable mature forest characteristics, including: higher proportion of hardwoods, western redcedar and legacy trees in the stand, and faster development of larger tree diameters.

3) Commercial Thinning

- Thinning from below would concentrate stand growth on fewer stems, resulting immediately in increased average stand diameter and, in the long range, larger diameter dominant and co-dominant trees with higher crown ratios compared to an unthinned stand.
- Hardwoods and disease/dwarf mistletoe-free minor conifer species (in this location, anything other than Douglas-fir), and trees with desirable characteristics for wildlife habitat would be retained. These retention criteria, combined with increased light stimulating understory development, would enhance vertical stand structural development.
- This treatment would keep future management options open.

4) Density Management, Connectivity

- A variable density thinning with patches of heavy, light or no thinning, with retained trees ranging from 70-170 trees per acre (averaging approximately 120 trees per acre) would increase stand structural diversity to meet Connectivity objectives.
- Growth rates would increase proportional to the intensity of the thinning – widely spaced areas would experience rapid tree growth and increased crown ratios while trees in the more lightly thinned areas would show less increased growth. This pattern of trees of the same age growing at varying rates across the treated area would enhance stand structural diversity.

b) Riparian Reserve Vegetation

1) Density Management, Riparian Reserve

- Thinning densities would be varied between approximately 70 to 160 retained trees per acre, with crown closures averaging 50-55 percent and never falling below 40 percent. The manner and results of treatment would be similar to density management in upland stands, but at a much smaller scale. In Riparian Reserve treatments adjacent to units 2-19A and B, treatments would be essentially the same as the upland stands. In other units, the riparian treatments would be noticeably different from the adjacent upland stands due to different goals for leave tree selection.
- Individual tree diameter growth would be accelerated in selected areas, providing riparian zones with enhanced potential for future large woody debris recruitment.
- Created snags and CWD, and increased vigor in both overstory and understory plant communities would enhance structural complexity and vertical canopy layering that are lacking in the vicinity.

c) Special Status Species and Noxious Weeds

- No Survey and Management or other Special Status plant species were found in areas directly affected by the Proposed Action, so no effects are expected.
- No significant increase in any of the noxious weed populations identified during the field surveys is expected to occur as a result of planned activities associated with the Proposed Action. Any increase that does occur should be short lived due to the revegetation by native species that is expected to occur over time.

4. Terrestrial Wildlife

1) Remnants, Snags, and Coarse Woody Debris (CWD)

- Virtually all of the existing snags and existing hard CWD, and most of the existing soft CWD would be retained intact. Some snags may need to be felled for safety and would become CWD. Hard CWD would more likely be moved, or rarely bucked, rather than lost, in the uncommon cases where operations could not avoid it. Soft CWD would be broken apart where operations could not avoid it, rather than lost.
- Little or no loss of snags or CWD would be expected from site preparation.
- No damage to or loss of old growth green trees or snags would be expected.
- In the long term, retained green trees, topped trees, and created snags would increase snag and CWD habitat densities in these stands.

2) Special Status, SEIS Special Attention, and Species of Concern

- **Special Habitats:** No known special habitats would be impacted by the proposed action.
- **Red Tree Voles:** No known red tree vole nest locations would be impacted by the proposed action. Habitat for undetected red tree voles may be degraded by reducing canopy closures below 60 percent. Adjacent and nearby stands would continue to provide habitat.
- **Trend:** The Lulay Camp proposal is not expected to result in a trend toward federal listing, loss of population viability, or elevation of status to any higher level of concern for any species.
- Federally listed species -- Northern spotted owl:
- This project "may affect, and is likely to adversely affect" the spotted owl due to the modification of dispersal and marginal suitable habitat.
- Section 7 Consultation has been completed with the United States Fish and Wildlife Service (USFWS) (Biological Opinion reference #1-7-00-F-0008, February 27, 2003), finding that the sale (proposed action) would not likely jeopardize the continued existence of the spotted owl and anticipates incidental take.
- In the short term, 297 acres of dispersal habitat would be altered, but be maintained as dispersal habitat after harvest. Suitable habitat conditions would be expected to develop in 20-40 years.
- In the short term, 42 acres of marginal suitable habitat would be downgraded to dispersal habitat as a result of thinning. Suitable habitat conditions would be expected to develop again in 10-30 years.
- Bureau Sensitive, SEIS Special Attention, and Other Species of Concern:
- Short term: Retention of existing snags and CWD would reserve habitat for primary excavators, amphibians and bat species. Direct impacts to these structures during logging could have short term adverse impacts to these species, but the effect is expected to be minimal due to the scarcity of the material. Impacts to species that use CWD in advanced decay classes are expected to be higher since there is more of this habitat, but still minimal with the design features in the proposed action. Some habitat drying would be expected with reduced canopy closure.
- Long term: Green tree retention, accelerated diameter growth, snag creation and CWD recruitment would contribute to habitat for primary excavators, amphibians and bat species in future stands.

- No treatment buffers and untreated Riparian Reserve would adequately protect aquatic amphibians.
- The change in stand structure may provide additional foraging and breeding habitat for the olive-sided flycatcher, which capitalizes on the benefits of green tree retention and understory development.
- Marginal habitat for goshawks would be degraded in the stands to be thinned.
- **Survey and Manage Mollusks:** Favorable habitat conditions for *MEHE* would be maintained in enough of the Habitat Area for the continued presence of this species. Most of the *MEHE* sites found during surveys would be protected.

3) Cumulative Effects on Late Successional Habitat

- The thinned stands would attain late successional forest habitat conditions when canopies recover, residual trees grow, and understory layers develop in about 10-40 years.
- The amount of late successional forest habitat on federal lands in the Thomas Creek and Crabtree Creek Watersheds would remain the same as before treatment, at 33 and 34 percent, respectively.

4) Cumulative Effects / Road Densities

- There would be a minor net increase of road densities, but a slight decrease in open road densities, as a result of the proposed action. Road densities would remain within the current description of approximately 4.5 to 5 miles per section.

5. Fisheries and Aquatic Habitat

- The design features of the proposed action are expected to prevent any adverse effects on aquatic habitat.
- The Riparian Reserve thinning is expected to accelerate individual tree growth, thereby increasing large woody debris recruitment potential, providing long-term benefits to the aquatic system.

6. Fire and Fuels

- The risk of wildfire ignition would still be low after completion of the proposed action.
- The expected consequences of a wildfire, if started, would be higher in treated areas than in untreated areas for the first few years, but within the control capabilities of available resources.
- Road decommissioning would not significantly affect on firefighting access since the road segments to be decommissioned are not suitable for fire engine access and distances for crew access are not increased significantly. Removal of the culvert in T. 10 S., R. 2 E., Section 19 would preclude engine access currently available on approximately ½ mile of road and would delay crew access approximately 10 minutes. This is not expected to be significant due to the low probability of fire in the forest stands in that area.

7. Visual, Recreation, and Rural Interface Resources

1) Visual Resources

- Changes to the visual character of the area's forested landscape would occur, but would not be expected to dominate the view of the casual observer.
- The proposed units (except 19A) would most likely retain enough canopy cover to still appear relatively natural, with some potential changes to contrast, color and texture.
- Unit 19A (regeneration harvest for windthrown stand restoration) would appear contiguous with a large, private clearcut immediately south of the unit.

2) Recreation Resources

- Current uses of the area would be restricted during harvest activities on the units.
- The visual character within the stands would be changed by harvest activities, but would still offer a relatively natural forest setting for dispersed recreational activities within to two five years.
- Existing trails would be altered. Those which follow logical skid trail/natural surface road routes (e.g. in unit 19D) would still be useable, but wider. Trails not used by logging equipment would be obliterated, but skid trails should provide alternate routes nearby.

3) Rural Interface Resources

- Log truck traffic would increase near residences along haul routes, with resulting increases in noise and dust. Restricting log hauling on weekends and holidays should reduce potential impacts.
- Smoke from pile burning on unit 19A should not reach residences, but if it does it should be well dispersed and of short duration.

8. Other

- Access
- Approximately ½ mile of dead-end road on the far side of the culvert to be removed adjacent to unit 2-19A would no longer be accessible to motor vehicles. This road is not currently needed for land management. In the unlikely event of a wildfire (see Chapter III) in the area, engine access to this area would be restricted, but crew access is available from the crossing and other roads.
- Approximately 600 feet of currently open road along the west side of unit 2-19B would be closed to motor vehicles. It would still be accessible by foot.
- No other public access or fire suppression access would change from current conditions.
-
- Cultural Resources - No impacts to Cultural Resources or Special Forest Products are expected.
-

Project 2 - Habitat Restoration Treatments without Wood Removal in Riparian Reserve

Water Quality, Hydrology, and Fisheries

- The existing water quality conditions, stream flows, and channel conditions at the project sites would continue their current trends of change.
- *Temperature:* The proposed action would not change the overall amount of shade within Riparian Reserves, therefore is not expected to affect stream temperatures. No other elements of Water Quality and Hydrology would be affected by this project.

Vegetation and Wildlife Habitat

- Creating snags in areas of the Riparian Reserve where dead wood habitat has been eliminated from the stands would help to restore some of this resource which is critical to the life cycle of several wildlife species.
- Some of the dominant/co-dominant trees in these areas would be killed to create these snags. The proportion of these trees used for this purpose would not be expected to change the live tree composition of the stand significantly.

Fuels – No measurable increase in fire risk is expected due to the small area being treated.

-

Critical and Other elements of the Environment [Appendix 1] not listed above:

Since there would be no ground disturbing activities, no effects to the resources listed in Appendix 1 are expected.

Chapter V PUBLIC INVOLVEMENT, CONSULTATION, MAJOR SOURCES, AND INTERDISCIPLINARY TEAM MEMBERS

A. Major Sources

Caliva, S. 2003. *Lulay Camp: Fuels Management /Fire Ecology Interdisciplinary Team Review.* Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Caruso, J. 2003. *Lulay Camp Timber Sale Soils Report*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

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Fennell, T. 2003. *Lulay Camp: Biological Evaluation For Special Status Plant Species/Survey & Manage Species And Noxious Weeds*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Graves, L. 2003. *Lulay Camp: Recreation, Rural Interface, and Visual Resources*, Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hawe, P. 2003. *Hydrology/Channels/Water Quality: Environmental Assessment for the Proposed Lulay Camp Project*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hawe, P. 2003. *Cumulative Effects Analysis of Peak Flow Events for the Lulay Camp Proposal.* Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hazen, P. and John Caruso 2002 and 2003. *Cultural Resource Inventory Reports, Lulay Camp Timber Sale*. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Hostetler, B.B., and D. W. Ross. 1996. *Generation of coarse woody debris and guidelines for reducing the risk of adverse impacts Douglas-fir beetle.* Unpublished paper, USDA Forest Service Westside Forest Insect and Disease Technical Center, Troutdale, OR.

Roberts, D. 2003. *Fisheries and Aquatic Habitat Report for the Lulay Camp Timber* Sale. Cascades Resource Area, Salem District, Bureau of Land Management. Salem, OR.

Rosling, D. 2003. *Lulay Camp: Silviculture Report and Riparian Reserve Treatments. Cascades Resource Area, Salem District*, Bureau of Land Management. Salem, OR.

This project follows direction in or is in compliance with following documents:

USDA. Forest Service. USDI. Bureau of Land Management. September 3, 2002. *Biological Assessment on Fiscal Year 2003-2004 projects within the Willamette Province which will modify the habitats of the bald eagle and the northern spotted owl.*

USDA. Forest Service., USDI. Bureau of Land Management. June 14, 2002. *Implementation of 2001 Survey and Manage Annual Species Review.* BLM Information Bulletin No. OR-2002-064. California, Oregon, and Washington.

USDA. Forest Service., USDI. Bureau of Land Management. 2001. *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation measures Standards and Guidelines.* Portland, OR.

USDA. Forest Service., USDI. Bureau of Land Management. 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.* Portland, OR.

USDA. Forest Service., USDI. Bureau of Land Management. 1994. *Final Supplemental Environmental Impact Statement Management of Habitat for Late Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.* Portland, OR.

USDA. Forest Service., USDI. Bureau of Land Management. 2003. *Implementation of 2002 Survey and Manage Annual Species Review* IM#2003-050. Portland, OR.

USDI. Bureau of Land Management. 2001. *Crabtree Watershed Analysis.* Salem, OR.

USDI. Bureau of Land Management. 2000. *Oregon and Washington Bureau of Land Management Special Status Species List - January 2000.* BLM Information Bulletin No. OR-2000-092. Oregon State Office, Portland, OR.

USDI. Bureau of Land Management. 1995. *Salem District Record of Decision and Resource Management Plan*. Salem, OR.

USDI. Bureau of Land Management. 1994. *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement.* Salem, OR.

USDI. Fish and Wildlife Service. 2003. *Formal and Informal Consultation on Fiscal Year 2003-2004 Routine Habitat modification Projects within the Willamette Province.* [Habitat Modification Biological Opinion – FWS reference: 1-7-03-F-0008]. Portland, OR.

USDI. Bureau of Land Management. 1996. *Thomas Creek Watershed Analysis.* Salem, OR.

B. Interdisciplinary Team Members

Resource	Specialist	Initials	Date
Botany TES and Special Attention Plant Species	Terry Fennell	TGF	6-11-03
Cultural Resources	Pete Hazen	FMP	6/11/03
Engineering	Robert Jordan	RLW	11 Jun 03
Fire and Fuels	Sam Caliva	SC	6/9/03
Fisheries	Dave Roberts	DAR	6/11/03
Hydrology/Water Quality	Patrick Hawe	RH	6/11/03 CDS 6/11/03
Logging Systems	Keith Walton	KW	6/11/03
Recreation, Rural Interface and Visual Resources	Laura Graves	LG	6/11/03
Riparian Ecology	Dave Rosling	DER	6/11/03
Silviculture	Dave Rosling	DER	6/11/03
Soils	John Caruso	COS for JC	6/11/03
Wildlife TES and Special Attention Animal Species	Jim England	JE	6/11/03

Chapter VI EA APPENDICES

Appendix 1: Environmental Elements

In accordance with law, regulation, Executive Order and policy, the interdisciplinary team reviewed the elements of the environment to determine if they would be affected by the proposed action (i.e., Alternative 2) described in Chapter II. The following two tables summarize the results of that review. Chapter IV contains a discussion of the environmental effects.

Table 7 lists the critical elements of the environment, which are subject to requirements specified in statute, regulation, or Executive Order. This table also contains the interdisciplinary team's predicted environmental effects per element if the activities of proposed action (i.e., Alternative 2) described in Chapter II of the Environmental Assessment were implemented. Unless otherwise specified, described effects apply to both projects.

Table 7: Critical Elements of the Environment

Critical Elements Of The Environment	**Environmental Effect**	**Interdisciplinary Team's Comments**
Air Quality	Project 1: Minimal Effect Project 2: None	Project 1: Burning of piles would be done in accordance with "The Oregon Smoke Management Plan". Project 2: No burning will take place
Areas of Critical Environmental Concern	None	There is no ACEC located within the project area.
Cultural, Historic, Paleontological	None	No cultural or archeological resources are known or expected to be present in the proposed project area.
Environmental Justice	None	The proposed action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
Flood Plains	None	No timber harvest would take place within flood plains.
Hazardous or Solid Wastes	None	
Invasive, Nonnative Species	Project 1: Minimal Effect Project 2: No Effect	Project 1: Effects to invasive, nonnative species are described in Chapter IV of the EA Project 2: Minor change in shade, no soil disturbance to provide a seedbed.
Native American Religious Concerns	None	No Native American religious concerns were identified.
Prime or Unique Farm Lands	None	There are no prime or unique farmlands located within the project area.
Threatened or Endangered Plant Species or Habitat	None	There are no known threatened or endangered plant species or habitat located within the project area.

Critical Elements Of The Environment	Environmental Effect	Interdisciplinary Team's Comments
Threatened or Endangered Wildlife Species or Habitat	Project 1: Minimal Effect Project 2: Beneficial Effect	Project 1: Effects to Threatened or Endangered wildlife species or habitat are described in Chapter IV of the EA. Project 2: Project 2 is expected to have a beneficial effect on late successional species by increasing diversity in Riparian Reserves.
Threatened or Endangered Fish Species or Habitat	Project 1: Minimal Effect Project 2: None	Effects to Threatened or Endangered fish species or habitat are described in Chapter IV of the EA.
Water Quality (Surface and Ground)	Project 1: Minimal Effect Project 2: None	Effects to water quality are described in Chapter IV of the EA.
Wetlands/Riparian Zones	Project 1: Minimal Effect Project 2: Beneficial Effect	Effects to Riparian Reserves are described in Chapter IV of the EA.
Wild and Scenic Rivers	None	There is no wild and scenic river located within the project area.
Wilderness	None	There is no wilderness located within the project area.

Table 8 lists other elements of the environment that are subject to requirements specified in law, regulation, policy, or management direction. This table also contains the interdisciplinary team's predicted environmental effects per element if the activities of proposed action (i.e., Alternative 2) described in Chapter II of the Environmental Assessment were implemented.

Table 8: Other Elements of the Environment

Elements Of The Environment	Environmental Effect and Interdisciplinary Team's Comments
Wildlife Species/Habitat: Special Status and Special Attention, (including Survey and Manage); Soils; Recreation; Rural Interface Areas; Visual Resources; Fish Species with Bureau Status including critical habitat	Project 1: Effects to these elements of the environment are described in Chapter IV of the EA . Project 2: No effects to Soils; Recreation; Rural Interface Areas; Visual Resources Effects to Wildlife Species/Habitat: Special Status and Special Attention, (including Survey and Manage); Fish Species with Bureau Status including critical habitat are described in Chapter IV of the EA.
Adverse Impacts on the National Energy Policy; Land Uses (including mining claims, mineral leases, etc.); Minerals; Plant Species/Habitat: (including Survey and Manage; Special Areas (Within or Adjacent)	No Environmental Effect. This project does not propose any activities related to these resources and/or there are no known instances of these resources in the area affected by the project.
Municipal Watershed	Project lies in a portion of City of Jefferson's municipal watershed. Effects to water quality are described in Chapter IV of the EA.
Water Resources (including Aquatic Conservation Strategy Objectives, beneficial uses [Salem FEIS Chapter 3-9], DEQ 303(d) listed streams, water temperature, sedimentation, water quantity, etc.)	Effects to water resources are described in Chapter IV of the EA Also see Appendix 2 for an evaluation of the project with regard to Aquatic Conservation Strategy Objectives.

Appendix 2 - Aquatic Conservation Strategy Objectives

Table 9: Documentation of the Lulay Camp Projects' Consistency with the Four Components of the Aquatic Conservation Strategy

ACS Component	Project Consistency
Component 1 - Riparian Reserves	The Riparian Reserve boundaries would be established consistent with direction from the Salem District Resource Management Plan (p. 10). Additionally, maintaining canopy cover along all streams and the wetlands would protect stream bank stability and water temperature. Additionally, there would be no road construction within the Riparian Reserve.
Component 2 - Key Watershed	The projects are located within the Crabtree Creek and Thomas Creek watersheds, which are not designated key watersheds.
Component 3 - Watershed Analysis	The Crabtree Creek Watershed Analysis document was completed in July 2001. The Thomas Creek Watershed Analysis document was completed in December 1996. Both projects are consistent with the recommendations in the Watershed Analyses.
Component 4 - Watershed Restoration	Increasing stand diversity in Riparian Reserves addresses this component.

Table 10: Documentation of the Lulay Camp Projects' Consistency with the Nine Aquatic Conservation Strategy Objectives

ACS Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Alternative 1: No Action

The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. *Does not retard or prevent the attainment of ACS Objective 1.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments): [Doesn't this apply to partial cut?]

  Over time the proposed treatments are expected to result in forest stands that exhibit attributes typically associated with stands of a more advanced age and stand structural development. (Larger trees, a more developed understory, an increase in the number, size and quality of snags and down logs). The net effect of this would be a more diverse and structurally complex landscape that would help to protect and enhance adjacent aquatic ecosystems. *Does not retard or prevent the attainment of ACS Objective 1.*

- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve):

  Past management has altered much of the landscape, including Riparian Reserves so that late-successional stand structure and the habitat it provides is limited across the watershed. There is a general scarcity of standing snags and coarse woody debris (CWD) in the early stages of decay across the watershed and in the area of the proposed action. Riparian areas with young conifer stands are common throughout the area. By treating the portions of the Riparian Reserves that are designated for creating up to 8 snags per acre we are afforded the opportunity to restore to a small part of the watershed some of the structural attributes that are lacking due to past management. This added diversity would help to restore some complexity to a simplified Riparian Reserve network. *Does not retard or prevent the attainment of ACS Objective 1.*

ACS Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. The network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian dependent species.

Alternative 1: No Action

The No Action alternative would have little effect on the connectivity of those features except that temporally restoration would occur over a longer period of time. The current condition of connectivity would be maintained. *Does not retard or prevent the attainment of ACS Objective 2.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)

  The proposed action would have little direct effect on connectivity between watersheds due to the discontinuous ownership patterns that exist. However, by restoring stand structural elements that provide habitat and refugia, it is anticipated that it would help to strengthen local connectivity within the watershed. *Does not retard or prevent the attainment of ACS Objective 2.*

- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  The proposed Riparian Reserve treatments would have little direct effect on connectivity between watersheds due to the discontinuous ownership patterns that exist. However, by restoring stand structural elements that provide habitat and refugia, it is anticipated that it would help to strengthen local connectivity within the watershed. *Does not retard or prevent the attainment of ACS Objective 2.*

ACS Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Alternative 1: No Action

The current condition of the physical integrity of the aquatic system would be maintained. *Does not retard or prevent the attainment of ACS Objective 3.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)
  This proposal is unlikely to alter the current condition of channels in the project area. Minimization of direct disturbances from the proposed action (e.g. increased flows or sediment delivery) is likely to result in the maintenance of stream channels in their current condition. *Does not retard or prevent the attainment of ACS Objective 3.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)
  With the limited scope of the project and retention of a no treatment buffer, the current condition of the physical integrity of the aquatic system would be maintained. *Does not retard or prevent the attainment of ACS Objective 3.*

ACS Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Alternative 1: No Action

The current condition of water quality would be maintained. *Does not retard or prevent the attainment of ACS Objective 4.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)
  Overall, this proposal is unlikely to have any measurable effect on stream temperatures in this watershed. BMPs and other design features are proposed to eliminate and/or limit, acceleration of sediment delivery to streams in the project area. As a result, it is unlikely that this proposal would lead to a measurable increase in sediment delivered to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. Since the proposed action is unlikely to result in any measurable increase in stream temperature or sedimentation, and would not place large amounts of fine organic material in the stream, it is unlikely that this proposal would have any measurable effect on dissolved oxygen levels in project area streams. D*oes not retard or prevent the attainment of ACS Objective 4.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)
  Since there would be no ground disturbance from this activity, no effects to water quality are expected. D*oes not retard or prevent the attainment of ACS Objective 4.*

ACS Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Alternative 1: No Action

The current condition of the sediment regime would be maintained. *Does not retard or prevent the attainment of ACS Objective 5.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)

  BMPs and other design features are proposed to eliminate and/or limit acceleration of sediment delivery to streams in the project area. As a result, it is unlikely that this proposal would lead to a measurable increase in sediment delivered to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. *Does not retard or prevent the attainment of ACS Objective 5.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  Since there would be no ground disturbance from this activity, and treatments would take place outside the stream zone, no effects to the sediment regime are expected. D*oes not retard or prevent the attainment of ACS Objective 5.*

ACS Objective 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Alternative 1: No Action

The current condition of in-stream flows would be maintained. *Does not retard or prevent the attainment of ACS Objective 6.*

Alternative 2: Proposed Action

- Project 1(Timber Harvest and Associated Silvicultural Treatments)

  Considering the small percentage of the watershed's coniferous forest that would be altered, the effect to base flows and peak flows is not likely to be significant or measurable. The cumulative effects analysis found low sensitivity to increases in peak flows and low potential risks for aquatic resources for normal storm events. *Does not retard or prevent the attainment of ACS Objective 6.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  This action would have no adverse effect on timing, magnitude, duration, and spatial distribution of peak, high, and low flows. *Does not retard or prevent the attainment of ACS Objective 6.*

ACS Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Alternative 1: No Action

The current condition of floodplain inundation and water tables would be maintained. *Does not retard or prevent the attainment of ACS Objective 7.*

Alternative 2: Proposed Action:

- Project 1(Timber Harvest and Associated Silvicultural Treatments)

  The current condition of floodplain inundation and water tables would be maintained. *Does not retard or prevent the attainment of ACS Objective 7.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  This action would have no adverse effect on floodplain inundation and water tables. *Does not retard or prevent the attainment of ACS Objective 7.*

ACS Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Alternative 1: No Action

The current condition of plant communities within riparian areas would be maintained. *Does not retard or prevent the attainment of ACS Objective 8.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)

  The proposed action would have no adverse effects on species composition and structural diversity of plant communities in riparian areas and wetlands due to implementing BMPs and additional design features in upland treatments, design features in Riparian Reserve treatments (including no treatment buffers), and the retention of full leave Riparian Reserves in most areas. The treatments would help to restore some structural diversity currently lacking on these sites. *Does not retard or prevent the attainment of ACS Objective 8.]*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  The proposed Riparian Reserve treatments would have no adverse effects on thermal regulation, nutrient filtering, or erosion processes within riparian zones or wetlands due to the small scope of the treatments, the untreated zones along stream channels, and because no materials would be removed from the sites treated. The treatments would help to restore some structural diversity currently lacking on these sites. *Does not retard or prevent the attainment of ACS Objective 8.*

ACS Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Alternative 1: No Action

The No Action alternative would result in the continued development at the current rate with no known effect on the dependent species. *Does not retard or prevent the attainment of ACS Objective 9.*

Alternative 2: Proposed Action

- Project 1 (Timber Harvest and Associated Silvicultural Treatments)

  The proposed action would have no adverse effect on riparian dependent species. Although thinning activities may affect invertebrates within the treatment areas, adjacent non-thinned areas should provide adequate refugia for the species. In the long term, the treatments would restore elements of structural diversity to the portions of Riparian Reserves selected for treatment. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species. *Does not retard or prevent the attainment of ACS Objective 9.*
- Project 2 (Habitat Restoration Treatments without Wood Removal in Riparian Reserve)

  The proposal would be designed solely for restoring elements of structural diversity to the portions of Riparian Reserves selected for treatment. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species. *Does not retard or prevent the attainment of ACS Objective 9.*

Appendix 3: Determination of Effect for Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon

Checklist for documenting environmental baseline and effects of proposed action(s) on relevant indicators for the Willamette Province.

Administrative Unit: **Salem District BLM**

Basin/Section 7 Watershed: **Crabtree Creek and Thomas Creek 5th field watersheds, tributary to the South Santiam River 4th field watershed**

Project: **Lulay Camp Timber Sale**

Table 11: Environmental Baseline and the Effects of the Actions on Relevant Indicators

FACTORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
INDICATORS	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature					X	
Sediment/Turbidity					X	
Chemical Contamination/Nutrients					X	
Habitat Access: Physical Barriers					X	
Habitat Elements: Substrate					X	
Large Woody Debris (LWD)					X	
Pool Frequency					X	
Pool Quality					X	
Off-Channel Habitat					X	
Channel Condition & Dynamics: Width/Depth Ratio					X	
Streambank Condition					X	
Floodplain Connectivity					X	
Flow/Hydrology: Peak/Base Flows					X	
Drainage Network Increase					X	
Watershed Condition: Road Density & Location					X	
Disturbance History					X	
Riparian Reserves					X	

Appendix 4: Maps

Project Vicinity Map

Unit Maps
T. 10 S., R. 1 E., Section 19
T. 10 S., R. 1 E., Section 29
T. 10 S., R. 1 E., Section 33
T. 10 S., R. 2 E., Section 19